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**An Investigation of Contributory Factors in the
Development of Paranoia**

Regina Murphy

Doctorate in Clinical Psychology

The University of Edinburgh

March 2020

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Thesis Abstract

Paranoia can manifest in a number of ways, ranging from concerns about others' intentions to delusions of persecution. It is one of the most prevalent symptoms of psychosis but can also be experienced by the general population to varying degrees. Although a wealth of research has focused on paranoia to date, there continue to be gaps in our understanding of what fosters its development. This thesis aimed to address these by exploring possible contributory factors in two distinct projects. The first chapter presents a meta-analysis which synthesised 26 studies to assess the association between paranoia and attachment insecurity. It found both to be moderately associated, with the magnitude of this link remaining consistent regardless of variations in age, sex, or diagnosis. The second chapter presents an experimental study which investigated whether paranoia could be precipitated by loneliness. The latter was induced in a sample of 80 nonclinical volunteers using a three-stage procedure. Statistical analysis indicated that changes in loneliness and changes in paranoia covaried. Despite a number of methodological limitations, these findings point towards a possible relationship between both experiences.

Lay Summary

Paranoia is characterised by worries that others may have bad intentions towards us. As paranoia is fairly common, anyone can experience it at times. Research shows that paranoia is higher in people with mental health difficulties like psychosis. This thesis looked at experiences which may explain why paranoia develops. The first chapter reviewed studies which focused on how people relate to others. It found that paranoia is linked to a tendency towards being unsure in relationships. This can be because of worries that others are not reliable or cannot be trusted. The second chapter describes a study which tested whether experiencing loneliness could lead to paranoia. This was done by recruiting 80 adults to take part in an experiment. Even though there were some issues in how the study was conducted, results showed that loneliness and paranoia were associated in our analyses. This suggests that there is a possible relationship between both experiences.

Chapter 1

The relationship between attachment insecurity and experiences on the paranoia continuum: a meta-analysis

Attachment and the Paranoia Continuum

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Abstract

Objectives Attachment has long been theorised to play a key role in the development of paranoia. Associations between both constructs have been reported over the last decade, but have ranged widely in magnitude to date. The present study is the first publication to synthesise existing literature and provide a meta-analytic estimate of the attachment-paranoia relationship. **Methods** A systematic search of studies available up to January 2019 was conducted using EMBASE, MEDLINE, CINAHL, PsycINFO, OpenGrey and ProQuest Dissertations & Theses Global. This yielded 26 studies which met inclusion criteria ($N=10,539$; mean age range 16-47; 45% male). Data were analysed using random effects models with restricted maximum likelihood variance estimator. Age and sex were examined as moderators in meta-regressions. **Results** Paranoia was significantly associated with attachment anxiety ($r = .38$; 95% CI: 0.32, 0.44; $p < .0001$; $I^2 = 88\%$; $k = 26$) and attachment avoidance ($r = .24$; 95% CI: 0.18, 0.29; $p < .0001$; $I^2 = 79\%$; $k = 26$). The strength of these associations did not differ between clinical and non-clinical participant samples. Neither age nor sex moderated identified relationships. **Conclusions** There is a moderate association between both constructs of interest. These findings suggest that attachment insecurity may be an active agent in the etiology and/or maintenance of experiences on the paranoia continuum. Implications for psychological treatment, e.g. consideration of attachment status in formulations, are briefly discussed. **Keywords** Attachment, Paranoia, Psychosis, Meta-Analysis

Practitioner Points

- Paranoia is associated with both attachment anxiety and attachment avoidance
- These associations are of similar strength for people with and without psychosis
- Attachment may contribute to the development and/or maintenance of paranoia
- It may be helpful to consider attachment in psychological therapies for psychosis

The data that support the findings of this study are presented within the manuscript.

1. Introduction

1.1 Paranoia Conceptualisation

Paranoia is defined by concerns about being vulnerable to the malevolent intent of others. It is characteristically underpinned by interpersonal themes, but can vary widely in specific content, e.g. from thoughts of being laughed at by others to thoughts of being the target of a conspiracy (Freeman & Garety, 2014). Paranoia is understood to occur on a continuum, extending from experiences which are common to experiences which are clinical. First proposed by Strauss, this conceptualisation stands in contrast to earlier views of paranoia as a discrete phenomenon, i.e. one which is either present or absent (Strauss, 1969). With improving precision of measurement, recent studies have been able to identify that nearly 30% of individuals in the general population experience elevated levels of paranoia (Freeman et al., 2019). While these can be compounded by stressors, such experiences are typically transitory and not associated with mental health difficulties (Ellett, Kingston, & Chadwick, 2018; van Os, Hanssen, Bijl, & Ravelli, 2000). However, more persistent paranoia has also been found to raise the risk for psychosis and can predict transition to diagnoses over time (Poulton et al., 2000; Wilcox et al., 2014). Paranoia is indeed one of the most prevalent symptoms of psychosis and can be identified in over 70% of first episodes (Coid et al., 2013). Factors which contribute to its development are still not well understood however.

1.2 Attachment Theory Framework

In recent years, attachment theory has provided a lens through which the etiology of paranoia can be considered. Attachment theory proposes that early experiences with caregivers shape how we operate in interpersonal contexts throughout the lifespan, i.e. we develop implicit templates for how we perceive, form expectations of, and behave towards others (Fraley & Shaver, 2000; Mikulincer & Shaver, 2007). If stressors impinge on the quality of these and lead to circumstances in which needs cannot be met consistently, attachment insecurity is more likely to develop. Forms of attachment insecurity can be found in about 40% of the general population, but are twice as prevalent in individuals with mental health difficulties, including psychosis (Bakermans-Kranenburg & van Ijzendoorn, 2009; Carr, Hardy, & Fornells-Ambrojo, 2018). Attachment insecurity is thought to manifest on two dimensions in adulthood, i.e. attachment anxiety and attachment avoidance. As these are conceptualised as orthogonal to each other, every individual would fall somewhere along both.

1.3 Attachment Insecurity

Attachment anxiety is characterised by worry about relationships. Individuals at the high end of this dimension tend to be concerned about others' perceptions of them and fear being rejected (Campbell & Marshall, 2011; Mikulincer & Shaver, 2003). Attachment avoidance is characterised by withdrawal from relationships. Individuals at the high end of this dimension tend to be uncomfortable with closeness and seek

independence from others (Mikulincer & Shaver, 2003; Mikulincer & Shaver, 2012). In both cases, caregivers have likely been experienced as unreliable, most typically in times of need (Berry, Danquah, & Wallin, 2014). Carried into adulthood, this fosters a sense of being unsure of others and compromises the ability to develop trust (Bentall & Fernyhough, 2008; Larose & Bernier, 2001; Mikulincer, 1995). Not surprisingly, individuals with these attachment patterns can be more likely to interpret interactions with others negatively and anticipate a degree of threat in these (e.g. Bentall et al., 2009; Freeman et al., 2013). Research suggests that this may present one possible mechanism through which paranoia is fostered and later maintained (Read & Gumley, 2010).

1.4 Mixed Evidence of Associations

The relationship between attachment insecurity and paranoia has been a topic of interest since the publication of the first review (Berry, Barrowclough, & Wearden 2007). Over the last decade, a growing number of studies have investigated associations between both constructs in different samples, e.g. comprised of the general population (Meins, Jones, Fernyhough, Hurndall, & Koronis 2008), individuals meeting Ultra High Risk criteria for psychosis (Russo et al., 2018), and those with established psychosis diagnoses (Strand, Goulding, & Tidefors, 2015). Across these, paranoia has been found to be correlated with both attachment anxiety and attachment avoidance. The strength of identified associations has varied considerably so far however, ranging from small ($r = 0.08$; Pearce et al., 2017) to large ($r = 0.61$; Darrell-Berry et al., 2017). Such variability is likely attributable to some study-level differences, e.g. in sample sizes and used measures. To date, this has unfortunately prevented clear conclusions about the degree to which attachment insecurity and paranoia are associated.

1.5 Aims of Meta-Analysis

A recent meta-analysis identified a small relationship between attachment insecurity and positive psychotic symptoms as a group category (Carr et al., 2018). We aimed to expand on these findings by estimating the specific association between attachment insecurity and paranoia across the continuum. In doing so, these key questions were posed: **(1)** What is the strength of the association between attachment anxiety and paranoia? **(2)** What is the strength of the association between attachment avoidance and paranoia? **(3)** Does the strength of these associations differ between clinical and non-clinical samples? Some studies have reported that paranoia is more prevalent in men than women, with a tendency toward younger age at first onset (Freeman et al., 2011; Johns et al., 2004). In view of this, it seemed appropriate to address the following final question: **(4)** Is the strength of the above associations moderated by demographic variables, specifically sex and age?

2. Methodology

2.1 Protocol Registration

In line with Preferred Reporting Items for Systematic Reviews and Meta-Analyses, the protocol for this meta-analysis was registered before any review processes were carried out (PRISMA; Moher, Liberati, Tetzlaff, & Altman, 2009). It was published on PROSPERO (registration number CRD42018112607) in November 2018. The protocol was not amended following preregistration.

2.2 Literature Search

A database search of studies published before January 2019 was conducted by one reviewer using EMBASE, MEDLINE, CINAHL and PsycINFO. Unpublished literature was searched for using OpenGrey and ProQuest Dissertations & Theses Global. To perform electronic searches with high sensitivity, variations of the following keywords were used in a two-component search strategy- (attachment AND (psychosis OR schizophrenia OR paranoia OR delusion OR schizotypy)). To identify studies which may have been missed, references in reviews covering related areas were also examined. After removal of duplicates, studies were screened by title and abstract to exclude clearly irrelevant reports. To reduce the risk of relevant studies being missed, screening was intentionally over-inclusive at this stage. The remaining studies were examined by full text to determine compliance with eligibility criteria. Where required, authors were contacted to provide additional information to resolve ambiguity, e.g. in cases where both attachment and paranoia were assessed, but associations not reported.

2.3 Eligibility Criteria

Studies were included in the meta-analysis if they (1) assessed both paranoia and attachment using validated measures; (2) provided information on associations between measures of paranoia and attachment, either within the paper or via correspondence; and (3) were written in English or German.

There were no exclusion criteria regarding study design. For studies examining interventions or using experimental procedures, only baseline data were considered. Studies were excluded if more than one third of the sample comprised participants with neurodevelopmental disorders or psychosis identified as secondary to other presentations, e.g. substance abuse or neurodegenerative conditions.

Included studies were categorised as comprising clinical samples if participants were described as having an At Risk Mental State, meeting Ultra-High-Risk criteria, experiencing first episode psychosis, holding another diagnosis of psychosis, or presenting with other diagnoses of mental health difficulties. Included studies were categorised as comprising non-clinical samples if participants were described as healthy volunteers or recruited from the general population.

2.4 Data Extraction

Due to resource restrictions, data extraction was performed by one reviewer using an electronic data collection form. As this approach may be associated with methodological concerns, data extraction was duplicated and checked for errors. Where any ambiguity was encountered, discussions were held between RM and KG. Information on the following variables was extracted for each included study: **(a)** Setting by Country; **(b)** Sample Mean Age; **(c)** Sample Size; **(d)** % Sample Male; **(e)** Sample Type; **(f)** Paranoia Measure; **(g)** Attachment Measure; and **(h)** effect size. For studies reporting on more than one participant sample, information was extracted for each cohort.

2.5 Risk of Bias Assessment

The risk of bias across studies was assessed with a tailored adaptation of the Agency for Healthcare Research and Quality tool (AHRQ, available in Appendix B; Williams, Plassman, Burke, Holsinger, & Benjamin, 2010). In adapting the AHRQ, we selected methodological domains most likely to influence estimates of the attachment-paranoia relationship at study level. These are presented in Table 3. Each study received a grading and corresponding score for every domain, i.e. Yes=2, Partial=1, No=0, Unclear=0, or Not Applicable=excluded from scoring. We then calculated the degree to which each study achieved its maximum total score. This was expressed as a percentage, with lower values reflecting higher risk of bias. All included studies were assessed by the first reviewer RM. To ensure that ratings were reliable, a subset of eight studies (31%) was independently assessed by AW.

2.6 Publication Bias

Presence of publication bias was initially assessed through visual examination of a funnel plot, i.e. effect size plotted against standard error (Sterne & Egger, 2001). In the absence of publication bias, a funnel plot can be expected to form a symmetrical shape. Asymmetry was also statistically assessed using the Egger Test, a linear regression analysis (Egger, Smith, Schneider, & Minder, 1997).

2.7 Meta-Analytic Model

All statistical analyses were conducted in the software environment R version 3.6.1 using the 'metafor' package (Viechtbauer, 2010). As eligible studies were anticipated to be methodologically heterogeneous, a random effects model was used, with a restricted maximum likelihood estimator to estimate between-study variance (Borenstein, Hedges, Higgins, & Rothstein, 2010). To index the proportion of effect size variability attributable to heterogeneity across studies, the I^2 statistic was computed and compared to thresholds specified in the Cochrane Handbook, i.e. <40% low and >75% high (Higgins & Green, 2011; Higgins & Thompson, 2002). Since methodological differences were likely to be significant across included literature, heterogeneity was expected to be high.

2.8 Effect Size Extraction

Pooled effect size estimates were computed for the association between paranoia and both attachment dimensions, i.e. attachment anxiety and attachment avoidance. If studies provided correlations between paranoia and attachment styles, the following strategy was adopted: correlations reported for preoccupied attachment and paranoia contributed to analyses for the anxiety dimension; correlations reported for dismissive attachment and paranoia contributed to analyses for the avoidant dimension.

Effect sizes were extracted as Pearson's correlation coefficient r . If studies reported Spearman's correlation coefficient r_s , a conversion table was used to approximate r for reported values (Rupinski & Dunlap, 1996). If studies reported linear regression data (i.e. Meins et al., 2008; Ponizovsky et al., 2013), the standardised regression coefficient β was used as an indicator of effect size (Nieminen, Lehtiniemi, Vähäkangas, Huusko, & Rautio, 2013). Where studies did not report any metrics of association, these were requested from authors.

To adjust for bias in the r distribution, all extracted correlations were converted to Fisher's Z prior to any further analyses (Hedges & Olkin, 1985). Each included study sample provided one correlation for effect size computations. If studies reported multiple correlations for the paranoia-attachment relationship, a simple average was computed for subsequent analysis (Hunter & Schmidt, 2004). The magnitude of obtained effect size estimates was interpreted according to conventions outlined by Cohen, i.e. small = 0.10, moderate = 0.30, large = 0.50 (Cohen, 1988).

2.9 Meta-Regression

In order to assess whether age and gender moderated above effect size estimates, meta-regression analyses were performed using below models. Within these, the effect size (ES) estimate was entered as an outcome variable, with v designating error variance.

$$ES = \beta_0 + \beta_1 (\text{age}) + v$$

$$ES = \beta_0 + \beta_1 (\text{sex}) + v$$

$$ES = \beta_0 + \beta_1 (\text{age}) + \beta_2 (\text{sex}) + v$$

3. Results

3.1 Literature Characteristics

As shown in Figure 1, literature search yielded an initial pool of 3,434 records. Three of these were written in German and identified via a search of reference lists. After removal of duplicate entries, a total of 2,401 records were screened; 116 of these were examined by full text. The final sample comprised 26 studies which met eligibility criteria. All included studies were composed between 2006 and 2019. Six of these were unpublished doctoral dissertations. Despite extended criteria, only English-language studies were identified to be suitable for inclusion.

3.2 Study Characteristics

Table 1 displays information on relevant study characteristics. 20 of the 26 included studies (77%) were conducted in the United Kingdom; the remaining studies were completed in Germany, Israel, Portugal, Spain, Sweden and the USA respectively. Overall, included studies comprised 10,539 participants ($M=351.30$, $SD=1056.43$, range 32–5877). More than half of this total was accounted for by a study which analysed US data from the National Comorbidity Survey (Sitko, Bentall, Shevlin, & Sellwood, 2014). The mean age reported for participant samples ranged from 16 to 47 years ($M=28.97$, $SD=9.92$). For one sample, the mean age was not obtainable. On average, samples were comprised of nearly 45% male participants ($M=44.60$, $SD=21.98$, range 11%–100%).

3.3 Sample Type Characteristics

The 26 included studies presented data for 30 independent samples. A total of 12 samples were categorised as clinical. Seven of these consisted of participants with established psychosis, identified to be part of a schizophrenia spectrum diagnosis; two samples specifically consisted of participants with first episode psychosis (i.e. Fish, 2010; Jones, 2015); one sample comprised participants with self-reported clinical levels of psychosis (i.e. Pearce et al., 2017); one sample comprised participants with Ultra-High-Risk of psychosis experiencing attenuated symptoms (i.e. Russo et al., 2018). In one study, participants were described to have various mental health difficulties (i.e. Dunne, 2011). As this was the only clinical sample in which no participants experienced psychosis or a related presentation, it was excluded from subsequent subgroup analyses. A total of 16 samples were categorised as non-clinical; these all consisted of participants described as student volunteers or recruits from the general population.

3.4 Sample Type Differences

Sample types differed in mean age, with clinical samples ($M = 33.58$, $SD = 9.94$) having a higher average age than non-clinical samples ($M = 25.88$, $SD = 9.02$). Sample types also differed with regard to gender distribution, with clinical samples ($M = 56.58$, $SD = 17.68$) being comprised of a higher proportion of male participants than non-clinical samples ($M = 35.56$, $SD = 22.35$).

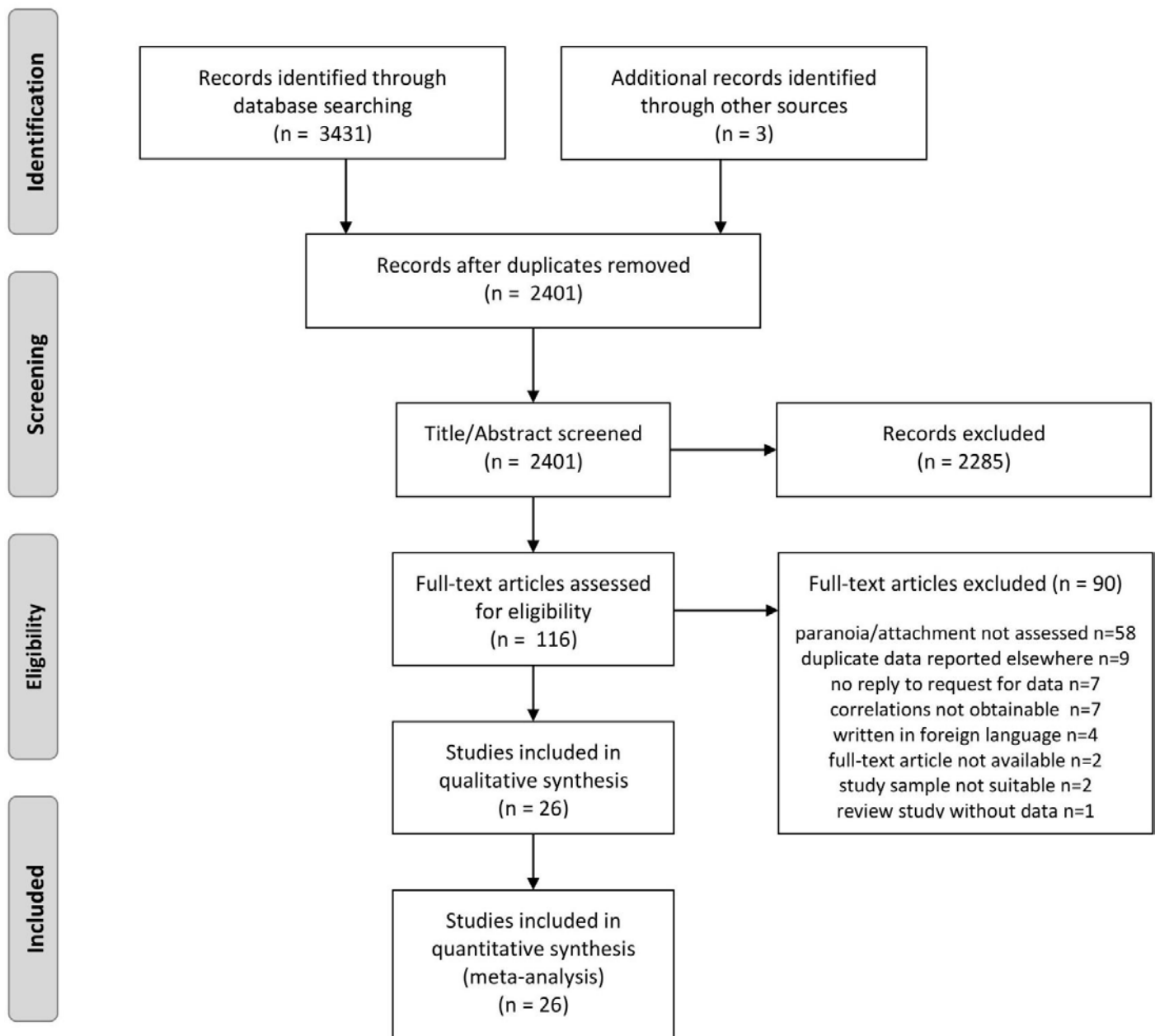


Figure 2. Prisma Flow Chart depicting Literature Screening Process.

3.5 Construct Measurement

Table 2 presents an overview of all measures used across the 26 included studies. Attachment was assessed using eight different measures. All of these were validated for use in adults and relied on self-report. For all measures, respondents made numerical ratings on Likert-type scales, with higher scores indicating higher levels of attachment insecurity. In 18 studies, which make up nearly 70% of the study pool, attachment was assessed along the dimensions of avoidance and anxiety. In the remaining eight studies, respondents were presented with three to four descriptions of attachment styles and rated the degree to which they identified with each, e.g. on a scale from 1 (*disagree strongly*) to 7 (*agree strongly*). Paranoia was assessed using 10 different measures. While 80% of these drew on self-report, the remaining measures were administered and scored by an interviewer. Only four of the identified measures were solely designed for the assessment of paranoia, but were used in a total of 14 studies, i.e. >50% of the study pool.

3.6 Risk of Bias

Independent ratings conducted by two reviewers yielded a Cohen's kappa of 0.83 prior to consensus discussion, indicating strong interrater reliability. As shown in Table 3, a total of 19 out of 26 studies achieved percentage ratings below 80% and were thus considered to display at least a moderate risk of bias. More than half of studies showed bias in participant recruitment, e.g. due to how studies were advertised, attracting individuals who self-selected. As most studies did not report a priori power calculations to justify their sample sizes, there was also a risk of findings biasing decisions about continuation of recruitment. Less than half of studies provided information regarding missing data or handling approaches. Whilst primarily a reporting issue, this raised concerns about the risk of biased findings.

3.7 Attachment Avoidance & Paranoia

3.7.1 Effect Size Estimate

The pooled effect size estimate for the above, computed drawing on 30 independent attachment-paranoia correlations, was $r = .24$ (95% CI: 0.18, 0.29; $p < .0001$). This was interpreted as small to moderate in magnitude, indicating that higher levels of attachment avoidance are significantly associated with higher levels of paranoia. As anticipated, heterogeneity was high ($Q = 218.32$, $p < .0001$, $I^2 = 78.60\%$), with almost 79% of effect size variability being attributable to between-study differences. Figure 2 presents a forest plot of extracted effect sizes for the avoidance dimension.

3.7.2 Publication Bias

Visual examination of the funnel plot for the avoidance dimension pointed towards a symmetric distribution of effect sizes (Figure 3). The Egger test corroborated this, confirming that funnel plot asymmetry was not significant ($z = 0.56$, $p = 0.57$). This suggested that the pooled effect size estimate of the attachment-paranoia relationship for the avoidance dimension is likely unaffected by publication bias.

3.7.3 Subgroup Analysis by Sample Type

As planned, a subgroup analysis was conducted to determine whether the above effect size estimates differed across included sample types. Results indicated that the difference between estimates for clinical samples ($k = 11$, $N = 791$, $r = .22$) and non-clinical samples ($k = 16$, $N = 3631$, $r = .26$) was not statistically significant for the avoidance dimension ($b_1 = 0.042$, $SE = 0.063$, $z = 0.67$, $p = 0.50$).

3.7.4 Meta-Regression

To assess whether demographic variables moderated the association between attachment and paranoia, meta-regression analyses were conducted. Within single predictor models, neither age ($\beta = -0.0031$, 95% CI = -0.0089 , 0.0027 ; $p = 0.30$) nor sex ($\beta = -0.0017$, 95% CI = -0.0044 , 0.0010 ; $p = 0.21$) were found to be significant moderators. These findings did not change when both variables were entered into one multi-predictor model ($p = 0.40$). This suggests that neither age nor sex account for much of the effect size heterogeneity in the avoidance dimension ($I^2 = 67.13\%$).

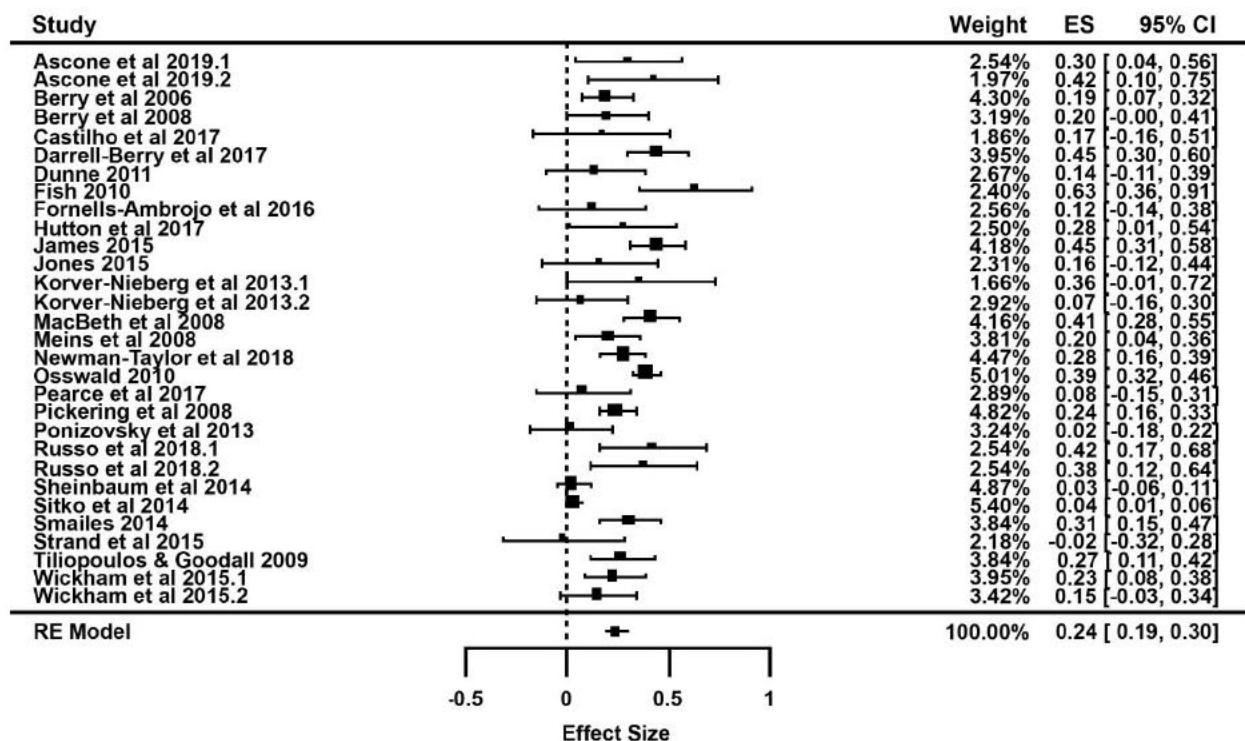


Figure 2. Forest Plot of Extracted Effect Sizes (ES) for Avoidance Dimension as Fisher's Z

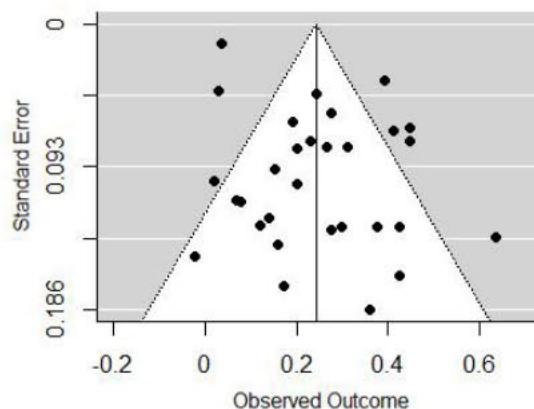


Figure 3. Funnel Plot of Extracted Effect Sizes for Avoidance Dimension

3.8 Attachment Anxiety & Paranoia

3.8.1 Effect Size Estimate

The pooled effect size estimate for the above, computed drawing on 30 independent attachment-paranoia correlations, was $r = .38$ (95% CI: 0.32, 0.44; $p < .0001$). This was interpreted as moderate to large in magnitude, indicating that higher levels of attachment anxiety are significantly associated with higher levels of paranoia. As predicted, heterogeneity was high again ($Q = 458.31$, $p < .0001$, $I^2 = 87.73\%$), with nearly 88% of effect size variability being attributable to between-study differences. Figure 4 presents a forest plot of extracted effect sizes for the anxiety dimension.

3.8.2 Publication Bias

Visual examination of the funnel plot for the anxiety dimension also indicated a symmetric distribution of effect sizes (Figure 5). The Egger test supported this once again, confirming that funnel plot asymmetry was not significant ($z = -0.73$, $p = 0.47$). This suggested that the pooled effect size estimate of the attachment-paranoia relationship for the anxiety dimension is also likely unaffected by publication bias.

3.8.3 Subgroup Analysis by Sample Type

As above, a subgroup analysis was conducted to determine whether the above effect size estimates differed across included sample types. Results indicated that the difference between estimates for clinical samples ($k = 11$, $N = 791$, $r = .34$) and non-clinical samples ($k = 16$, $N = 3629$, $r = .42$) was also not statistically significant for the anxiety dimension ($b_1 = 0.086$, $SE = 0.079$, $z = 1.09$, $p = 0.28$).

3.8.4 Meta-Regression

As above, the same meta-regression analyses were repeated. Within single predictor models, neither age ($\beta = -0.0065$, 95% CI = -0.0131, 0.0002; $p = 0.06$) nor sex ($\beta = -0.0018$, 95% CI = -0.0051, 0.0016; $p = 0.30$) were found to be significant moderators. These findings did not change when both variables were entered into one multi-predictor model ($p = 0.14$). This suggests that neither age nor sex account for much of the effect size heterogeneity in the anxiety dimension ($I^2 = 76.15\%$).

3.9 Effect Size Comparison

A separate analysis compared the effect sizes obtained for each attachment dimension. Results indicated that both estimates differed significantly in magnitude ($b_1 = -0.156$, $SE = 0.047$, $z = -3.36$, $p < .001$), with paranoia being more strongly associated with attachment anxiety ($r = .38$) than attachment avoidance ($r = .24$).

3.10 Additional Unplanned Analyses

To assess whether meta-analytic findings were sensitive to the type of effect size reported in primary research, studies which reported attachment-paranoia correlations as Spearman's r_s were removed in a sensitivity analysis. Results indicated that adjusted effect size estimates did not differ significantly from original findings (avoidance dimension $r = .22$, $b_1 = 0.020$, $SE = 0.042$, $z = 0.47$, $p = 0.64$; anxiety dimension $r = .36$, $b_1 = 0.019$, $SE = 0.052$, $z = 0.37$, $p = 0.71$).

For three included studies, two attachment-paranoia correlations were reported and averaged for analysis (Korver-Nieberg et al., 2013; Newman-Taylor et al., 2018; Wickham, Sitko, & Bentall 2015). When these were removed in a second sensitivity analysis, both adjusted effect size estimates were identical to our original findings (avoidance dimension $r = .24$; anxiety dimension $r = .38$).

As noted above, eight studies assessed attachment as styles as opposed to dimensions. When these were removed in a final sensitivity analysis, both adjusted effect size estimates rose slightly, but did not significantly differ from original findings (attachment anxiety $r = .40$, $b_1 = -0.030$, $SE = 0.056$, $z = -0.53$, $p = 0.59$; attachment avoidance $r = .28$, $b_1 = -0.044$, $SE = 0.042$, $z = -1.05$, $p = 0.29$).

A meta-regression was performed to establish if risk of bias accounted for any effect size variability. It emerged as a significant moderator for the avoidance dimension ($\beta = 0.0057$, 95% CI = 0.0016, 0.0099; $p = 0.007$; $f^2 = 68.58\%$), but not for the anxiety dimension ($\beta = 0.0052$, 95% CI = -0.0006, 0.0110; $p = 0.08$; $f^2 = 85.03\%$).

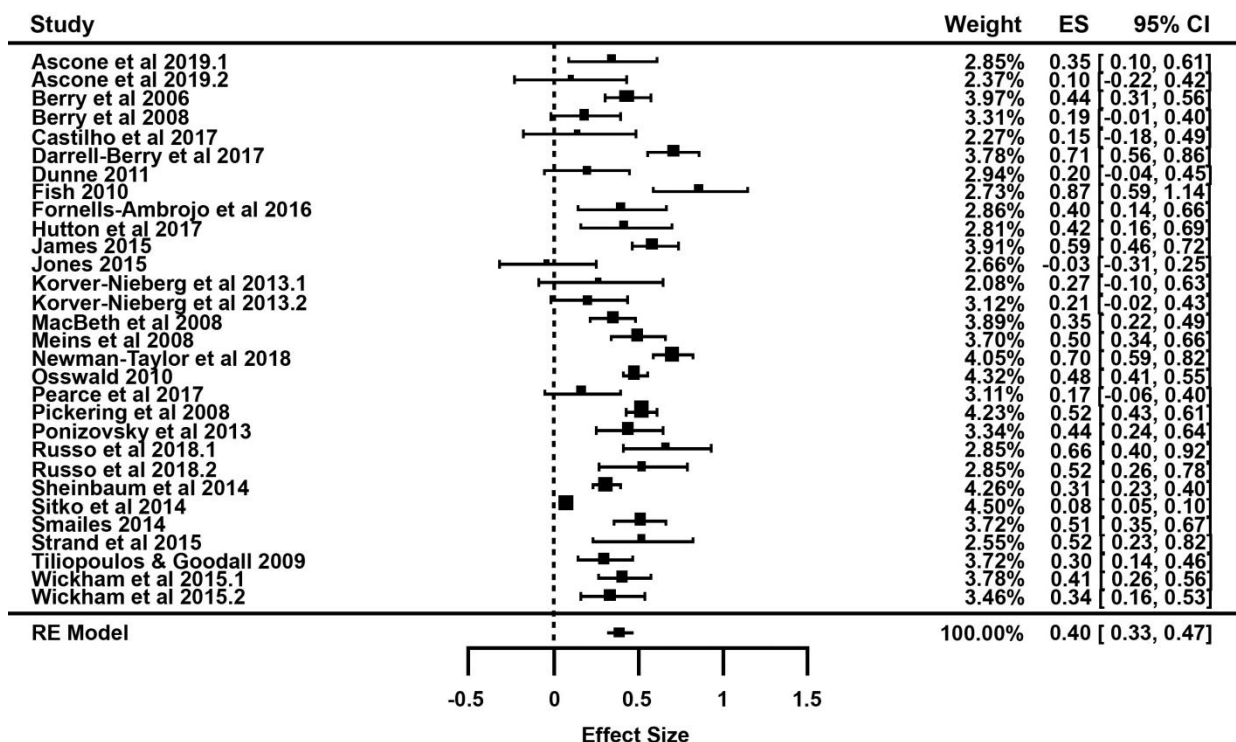


Figure 4. Forest Plot of Extracted Effect Sizes (ES) for Anxiety Dimension as Fisher's Z

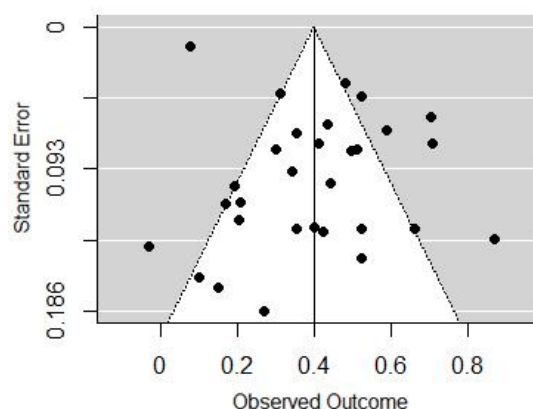


Figure 5. Funnel Plot of Extracted Effect Sizes for Anxiety Dimension

Table 1. Summary of Study Characteristics (26 included studies with 30 independent samples)

	Study	N	Setting	% male	Mean Age	Paranoia Measure	Attachment Measure	Effect Size <i>r</i> Avoidance	Effect Size <i>r</i> Anxiety
<i>non-clinical</i>	Ascone et al. 2019	40	Germany	33	40	PCL	RSQ	0.40	0.10
	Berry et al. 2006	244	UK	28	21 ^a	PS	PAM	0.19	0.41
	Fornells-Ambrojo et al. 2016	61	UK	100	23	PS	RQ ^c	0.12	0.38
	Hutton et al. 2017	59	UK	20	21	PS	ECR-R	0.27	0.40
	James 2015 [†]	221	UK	22	36	GPTS	ASQ	0.42 ^d	0.53 ^d
	Korver-Nieberg et al. 2013	78	UK	64	16	GPTS ^b	PAM	0.07	0.21
	MacBeth et al. 2008	213	UK	22	20	PS	RSQ	0.39 ^d	0.34 ^d
	Meins et al. 2008	154	UK	44	21	SPQ	RQ	0.20 ^e	0.46 ^e
	Newman-Taylor et al. 2018	296	UK	11	20	PS/PCL ^b	ECR	0.27 ^d	0.61 ^d
	Osswald 2010 [†]	722	UK	37	25	PS	PAM	0.37	0.45
	Pickering et al. 2008	503	UK	30	21	PADS	RQ	0.24	0.48
	Russo et al. 2018	60	UK	43	23 ^a	SSI-BV	PAM	0.40	0.58
	Sheinbaum et al. 2014	546	Spain	17	21	SPQ	RQ ^c	0.03	0.30
	Smailes 2014 [†]	160	UK	14	21	PADS	RQ	0.30	0.47
	Tiliopolous & Goodall 2009	161	UK	32	47	SPQ	ECR	0.26	0.29
	Wickham et al. 2015	113	UK	52	38	PANSS/PADS ^b	RQ	0.15	0.33
<i>clinical</i>	Ascone et al. 2019	60	Germany	37	40	PCL	RSQ	0.29	0.34
	Berry et al. 2008	96	UK	68	44	PANSS	PAM	0.20	0.19
	Castilho et al. 2017	37	Portugal	81	37	PCL	ECR-RS	0.17	0.15
	Dunne 2011 [†]	66	UK	26	39	SPQ	RQ ^c	0.14	0.20
	Fish 2010 [†]	55	UK	64	23	SSI-BV	PAM	0.56 ^d	0.70 ^d
	Jones 2015 [†]	51	UK	59	22	PANSS	RQ ^c	0.16 ^d	-0.03 ^d
	Korver-Nieberg et al. 2013	32	UK	61	17	GPTS ^b	PAM	0.35	0.26
	Pearce et al. 2017	77	UK	27	40	CAPE	RQ ^c	0.08 ^d	0.17 ^d
	Ponizovsky et al. 2013	100	Israel	70	40	PANSS	RQ ^c	0.02 ^e	0.42 ^e
	Russo et al. 2018	60	UK	52	20 ^a	SSI-BV	PAM	0.36	0.48
	Strand et al. 2015	47	Sweden	64	43	SCL-90-R	RQ ^c	-0.02 ^d	0.48 ^d
	Wickham et al. 2015	176	UK	70	38	PANSS/PADS ^b	RQ	0.23	0.39
<i>mixed</i>	Darrell-Berry et al. 2017	174	UK	40	23	GPTS	PAM	0.42	0.61
	Sitko et al. 2014	5877	USA	50	NA	UM-CIDI	AAQ ^c	0.04	0.08

Notes: [†]unpublished doctoral dissertation. *N* denotes sample sizes for which correlations were derived. ^aonly median age was reported and used in analyses. ^b Due to use of multiple measures, two correlations were extracted and averaged. ^c Attachment was assessed as a style, e.g. preoccupied and dismissing. ^d originally reported as Spearman's *r_s*. ^eoriginally reported as β value. **Paranoia Measures:** CAPE (Community Assessment of Psychotic Experiences; Stefanis et al., 2002); GPTS (Green Paranoid Thoughts Scale; Green et al., 2008); PADS (Persecution and Deservedness Scale; Melo et al., 2009); PANSS (Positive and Negative Syndrome Scale; Kay et al., 1987); PCL (Paranoia Checklist; Freeman et al., 2005); PS (Paranoia Scale; Fenigstein & Venable, 1992); SCL-90-R (Symptom Checklist; Derogatis, 1997); SPQ (Schizotypal Personality Questionnaire; Raine, 1991); SSI-BV (Schizotypal Symptoms Inventory-Brief Version; Hodgekins et al., 2012); UM-CIDI (University of Michigan Composite International Diagnostic Interview; Wittchen & Kessler, 1994). **Attachment Measures:** AAQ (Adult Attachment Questionnaire; Hazan & Shaver, 1987); ASQ (Attachment Style Questionnaire; Feeney et al., 1994); ECR (Experiences in Close Relationships; Brennan et al., 1998); ECR-R (Experiences in Close Relationships- Revised; Fraley et al., 2000); ECR-RS (Experiences in Close Relationships- Relationship Structure; Fraley et al., 2011); PAM (Psychosis Attachment Measure; Berry et al., 2006, validation study); RQ (Relationship Questionnaire; Bartholomew & Horowitz, 1991); RSQ (Relationship Scales Questionnaire; Griffin & Bartholomew, 1994).

Table 2. Summary of Measure Characteristics

	Measure	Focus	Description	Internal Consistency [‡]
Attachment	AAQ	romantic relationships	3 items, describing distinct attachment styles, each rated on 4-point scale	α not available
	ASQ	general relationships	40 items, assessing attachment dimensions avoidance/anxiety, rated on 6-point scale	$\alpha = .86$ both dimensions
	ECR	romantic relationships	36 items, assessing attachment dimensions avoidance/anxiety, rated on 7-point scale	$\alpha \geq .90$ both dimensions
	ECR-R	romantic relationships	36 items, assessing attachment dimensions avoidance/anxiety, rated on 7-point scale	$\alpha \geq .93$ both dimensions
	ECR-RS	close relationships	9 items, assessing attachment dimensions avoidance/anxiety, rated on 7-point scale, ratings made for each relationship, i.e. mother, father, romantic partner, best friend.	$\alpha \geq .83$ both dimensions
	PAM	close relationships	16 items, assessing attachment dimensions avoidance/anxiety, rated on 4-point scale, designed for individuals with psychosis, used in both clinical and non-clinical samples	$\alpha \geq .75$ both dimensions
	RQ	general relationships	4 items, describing distinct attachment styles, each rated on 7-point scale (4 studies), scores can also be computed for attachment dimensions avoidance/anxiety (7 studies)	α not available
	RSQ	close relationships	30 items, assessing attachment dimensions avoidance/anxiety, rated on 5-point scale	$\alpha \geq .68$ both dimensions
Paranoia	CAPE	general psychotic experiences	42 items, assessing different psychotic experiences, 5 items on paranoia subscale, assessing paranoia frequency, rated on 4-point scale	$\alpha = .77$ subscale
	GPTS	paranoia continuum experiences	32 items, assessing social reference & social persecution, rated on 5-point scale	$\alpha \geq .90$ full scale
	PADS	paranoia continuum experiences	10 items, assessing social persecution & perceived deservedness, rated on 5-point scale	$\alpha \geq .84$ full scale
	PANSS [†]	clinical psychotic experiences	30 items, semi-structured interview, one suspiciousness/persecution item in positive symptoms subscale, scored on 7-point scale	$\alpha \geq .70$ subscale
	PCL	paranoia continuum experiences	18 items, assessing social reference & social persecution, rated on 5-point scale	$\alpha \geq .75$ full scale
	PS	paranoia in general population	20 items, assessing social suspicion and social persecution, rated on 5-point scale	$\alpha \geq .93$ full scale
	SCL-90-R	general psychopathology	90 items, assessing various symptoms experienced over 7 days, rated on 5-point scale, paranoid ideation subscale consists of 6 items	$\alpha = .80$ subscale
	SPQ	schizotypy in general population	74 items, assessing schizotypy, 8 items on paranoia subscale, rated yes/no	$\alpha \geq .76$ subscale
	SSI-BV	schizotypy in general population	20 items, assessing schizotypy, 6 items on paranoia subscale, rated on 5-point scale	$\alpha \geq .85$ subscale
	UM-CIDI [†]	general psychopathology	Semi-structured interview, 3 paranoia items rated as Yes (score 1) or No (score 0)	α not available

Notes: [†]interview-based measure scored by interviewer; [‡] Cronbach's alpha corresponds to lowest value reported across studies or information from available validation data. **Paranoia Measures:** CAPE (Community Assessment of Psychotic Experiences; Stefanis et al., 2002); GPTS (Green Paranoid Thoughts Scale; Green et al., 2008); PADS (Persecution and Deservedness Scale; Melo et al., 2009); PANSS (Positive and Negative Syndrome Scale; Kay et al., 1987); PCL (Paranoia Checklist; Freeman et al., 2005); PS (Paranoia Scale; Fenigstein & Venable, 1992); SCL-90-R (Symptom Checklist; Derogatis, 1997); SPQ (Schizotypal Personality Questionnaire; Raine, 1991); SSI-BV (Schizotypal Symptoms Inventory-Brief Version; Hodgekins et al., 2012); UM-CIDI (University of Michigan Composite International Diagnostic Interview; Wittchen & Kessler, 1994). **Attachment Measures:** AAQ (Adult Attachment Questionnaire; Hazan & Shaver, 1987); ASQ (Attachment Style Questionnaire; Feeney et al., 1994); ECR (Experiences in Close Relationships; Brennan et al., 1998); ECR-R (Experiences in Close Relationships- Revised; Fraley et al., 2000); ECR-RS (Experiences in Close Relationships- Relationship Structure; Fraley et al., 2011); PAM (Psychosis Attachment Measure; Berry et al., 2006, validation study); RQ (Relationship Questionnaire; Bartholomew & Horowitz, 1991); RSQ (Relationship Scales Questionnaire; Griffin & Bartholomew, 1994).

Table 3. Summary of Risk of Bias Assessment

Study	Sample Recruitment	Sample Size ^a	Sample Description	Attachment Assessment	Paranoia Assessment	Missing Data	Adequate Analysis	% of maximum total score
Ascone et al. 2019	PARTIAL	PARTIAL	PARTIAL	YES	YES	NA ^d	YES	75
Berry et al. 2006	NO	PARTIAL	YES	YES	YES	UNCLEAR	YES	64
Berry et al. 2008	YES	PARTIAL	YES	YES	PARTIAL ^c	PARTIAL	YES	79
Castilho et al. 2017	PARTIAL	PARTIAL	YES	YES	YES	UNCLEAR	YES	71
Darrell-Berry et al. 2017	YES	PARTIAL	YES	YES	YES	NA ^d	YES	92
Dunne 2011	YES	NO ^b	PARTIAL	YES	YES	YES	YES	79
Fish 2010	YES	PARTIAL ^b	YES	YES	YES	YES	YES	93
Fornells-Ambrojo et al. 2016	PARTIAL	PARTIAL	YES	YES	YES	YES	YES	86
Hutton et al. 2017	NO	PARTIAL	PARTIAL	YES	YES	UNCLEAR	YES	57
James 2015	PARTIAL	YES ^b	YES	YES	YES	YES	YES	93
Jones 2015	YES	YES ^b	PARTIAL	YES	PARTIAL ^c	NA ^d	YES	83
Korver-Nieberg et al. 2013	YES	PARTIAL	PARTIAL	PARTIAL ^e	PARTIAL ^e	UNCLEAR	YES	57
MacBeth et al. 2008	NO	PARTIAL	PARTIAL	YES	YES	UNCLEAR	YES	57
Meins et al. 2008	NO	PARTIAL	YES	YES	YES	UNCLEAR	YES	64
Newman-Taylor et al. 2018	NO	PARTIAL	YES	YES	YES	NA	YES	75
Osswald 2010	PARTIAL	YES ^b	YES	YES	YES	NA ^d	YES	92
Pearce et al. 2017	YES	PARTIAL	YES	YES	YES	PARTIAL	YES	86
Pickering et al. 2008	NO	PARTIAL	PARTIAL	YES	YES	YES	PARTIAL ^f	64
Ponizovsky et al. 2013	YES	PARTIAL	YES	YES	PARTIAL ^c	UNCLEAR	PARTIAL	64
Russo et al. 2018	YES	PARTIAL	YES	YES	YES	UNCLEAR	PARTIAL	71
Sheinbaum et al. 2014	NO	PARTIAL	PARTIAL	YES	YES	UNCLEAR	YES	57
Sitko et al. 2014	YES	PARTIAL	PARTIAL	YES	PARTIAL ^e	UNCLEAR	YES	64
Smailes 2014	PARTIAL	PARTIAL	YES	YES	YES	YES	PARTIAL ^f	79
Strand et al. 2015	YES	NO ^b	YES	YES	YES	UNCLEAR	YES	71
Tiliopolous & Goodall 2009	NO	PARTIAL	YES	YES	YES	UNCLEAR	PARTIAL	57
Wickham et al. 2015	YES	PARTIAL	YES	YES	PARTIAL ^c	YES	PARTIAL	79

Notes: ^a the majority of studies did not report a priori power calculations and were thus downgraded; ^b a priori power calculation reported; ^c study downgraded for single item measure; ^d study reported there was no missing data; ^e unclear if measure suitable for sample; ^f type of correlation coefficient not reported and thus assumed to be Pearson's *r*.

4. Discussion

4.1 Effect Size Estimates

Our results suggest that paranoia is associated with both attachment dimensions. Analysis also indicated that respective estimates differ significantly in magnitude, with paranoia being more strongly associated with attachment anxiety ($r = .38$) than attachment avoidance ($r = .24$). This is somewhat surprising, especially since expectations of the reverse were expressed in initial reviews (e.g. Berry et al., 2007; Korver-Nieberg, Berry, Meijer, & de Haan, 2014). As the corpus of literature has since expanded however, the present findings are derived from a much larger data pool. It is also of note that recent reviews in this field have described patterns which are in line with the above (Carr et al., 2018; Lavin, Bucci, Varese, & Berry, 2019).

Our findings suggest that attachment anxiety is more strongly implicated in paranoia than attachment avoidance. It is conceivable that the discrepancy in effects merely represents a difference in reporting however, i.e. compared to individuals high on attachment anxiety, those high on attachment avoidance may be more inclined to underreport paranoia. Studies describing links between the latter dimension and tendencies toward symptom minimisation support this, both in the general population and in those with psychosis (Gumley, Taylor, Schwannauer, & MacBeth, 2014; Mikulincer & Shaver, 2007). This may be attributable to deactivating coping strategies, through which individuals with high attachment avoidance manage distress by denying it (Mikulincer & Shaver, 2003).

A perhaps even more compelling caveat pertains to the final meta-regression, conducted as a post-hoc analysis to test the robustness of our main estimates. It revealed that the strength of the attachment-paranoia relationship rose with decreasing risk of bias in the avoidance dimension. This finding does not only indicate that the present effect size of $r = .24$ was influenced by study level methodology, but also that it likely represents an underestimate. In view of this, the difference in effect size magnitudes described above might for the most part only be the product of artifact. We would therefore urge readers to exercise caution in drawing inferences about this finding.

It is notable that effect size estimates were not found to differ across samples, i.e. magnitudes were comparable for those comprising the general population and those comprising individuals with psychosis. This indicates that attachment insecurity has a similar bearing on paranoia irrespective of whether it meets a diagnostic threshold. This is in line with research which identified factors such as trauma to be similarly implicated in paranoia across different severity levels (e.g. Valmaggia et al. 2015). By extension, this finding also provides further evidence in support of the continuum model, according to which there is continuity between common and clinical experiences of paranoia (Elahi, Perez Algorta, Varese, McIntyre, & Bentall, 2017).

4.2. Interpretation of Associations

As this meta-analysis predominantly synthesised cross-sectional data collected at a single time point, it is not possible to draw conclusions about the directionality of identified associations, even if these are presumed to be causal in nature. As longitudinal studies highlight, the experience of mental health difficulties can lead to subsequent rises in both attachment anxiety and attachment avoidance (Cozzarelli, Karafa, Collins, & Tagler, 2003; Solomon, Dekel, & Mikulincer, 2008). In the case of paranoia, such changes may be especially likely due to the coping strategies individuals tend to resort to, e.g. withdrawal may be used to avoid the threat others pose, but also have a detrimental impact on relationships over time (Hajduk, Klein, Harvey, Penn, & Pinkham, 2018). For this to occur, the experience would not need to be severe, but simply enduring. It is consequently conceivable that both phenomena are associated due to paranoia promoting attachment insecurity.

Across existing literature, a perhaps more frequently considered view focuses on attachment insecurity promoting paranoia (Bentall et al., 2014). Evidence in support of it mainly derives from longitudinal studies which report links between attachment insecurity in childhood and various forms of psychopathology in adulthood (e.g. Pascuzzo, Moss, & Cyr, 2015; Sroufe, Egeland, Carlson, & Collins, 2005). More recently, the relationship between both phenomena was also investigated in an experience sampling study, involving daily repeated measurements over a week (Sitko, Varese, Sellwood, Hammond, & Bentall, 2016). Data showed that increases in attachment insecurity predicted subsequent increases in paranoia, both in individuals with psychosis and those recruited from the general population. While the sample of 20 N per group was small in this study, its findings corroborate a possible causal pathway. To further improve our understanding of observed associations, more research involving data collection over more than one time point is required.

4.3 Suggested Mechanisms

Literature has suggested several mechanisms through which attachment insecurity may have a bearing on paranoia, either by fostering its development or maintaining it. One of these pertains to the impact of how the self and others are conceptualised, e.g. high attachment anxiety is assumed to entail a negative view of the self, while high attachment avoidance is assumed to entail a negative view of others (Pietromonaco & Feldman Barrett, 2000). At the most extreme ends, this can culminate in self-concepts centred on vulnerability and other-concepts centred on malevolence. If carried into adulthood, these can function as lenses through which the social environment is processed (Bretherton & Munholland, 2008). Studies suggest that the sequelae of this may manifest in various ways, e.g. others are more likely to be perceived as hostile and their actions interpreted as ill intentioned (Collins & Feeney, 2004; Pereg & Mikulincer, 2004). Over time, such tendencies can heighten the anticipation of threat from others and promote paranoia. While this is by far not the only possible route, it is supported by recent research and fits well into existing paranoia models (Freeman & Garety, 2000; Raihani & Bell, 2017).

4.4 Clinical Practice Implications

In view of the associations identified in this meta-analysis, it is possible that individuals who present with paranoia in mental health settings may exhibit attachment insecurity. This should be expected to have a bearing on how individuals relate to the social environment, including services more broadly and clinicians more specifically (Taylor, Rietzschel, Danquah, & Berry, 2015). It is likely that great care may be required to develop a therapeutic relationship in which such individuals can experience trust and safety. By extension, our findings also suggest that consideration of attachment may be valuable in the treatment of psychosis, particularly if paranoia is a significant part of its presentation. This is in line with previous reviews which proposed attachment to play a role in psychosis recovery (e.g. Gumley et al., 2014). If individuals are receptive to this, information on attachment status could be incorporated into formulations during therapy, e.g. to make sense of why paranoia may have developed and/or continues to be a problem.

4.5 Strengths and Limitations

We need to highlight several issues which may limit the conclusions drawn from present findings. Firstly, it is of note that the assessment of attachment was not consistent across studies, i.e. some used ratings on attachment dimensions (70%) while others used ratings on attachment styles (30%). While we tried to combine these in the most sensible way, our solution was somewhat artificial and may have resulted in some loss of information. To examine this, eight studies employing non-dimensional attachment assessment were removed in a sensitivity analysis. Even though results suggested that this did not significantly skew our effect size estimates, we still need to highlight this as a limitation.

Another issue relates to the exclusive reliance on self-report in assessing attachment across studies. It has been questioned whether self-report is a valid assessment approach for those who experience psychosis, especially if paranoia is a principal part of it (Bell, Fiszdon, Richardson, Lysaker, & Bryson, 2007). As research suggests, such individuals are more inclined to view others negatively and show biased recollection for threatening information (Pinkham, Harvey, & Penn, 2016; Taylor & John, 2004). In conjunction, these epiphenomena could lead to negatively distorted accounts, with those with more severe paranoia reporting higher levels of attachment insecurity. While plausible, this does not seem to be supported by research however, e.g. when currently unwell CMHT patients with paranoia were compared to those in remission, there was no significant difference in accounts of previous relationship histories (Rankin, Bentall, Hill, & Kinderman, 2005). This suggests that presence of paranoia, even if part of a diagnosable presentation, should not necessarily render reports of attachment unreliable. Moreover, our present findings show that the magnitude of associations did not differ between general population samples with less severe paranoia and psychosis samples with more severe paranoia.

With the inclusion of unpublished literature, this meta-analysis aimed to capture a more comprehensive pool of studies. This marks an advance on previous publications and has allowed us to obtain results which are reasonably representative of the status quo of research in this field. This is also supported by our analyses, which indicated that present findings were unlikely to have been affected by publication bias. In addition to this strength however, we have to acknowledge that our reliance on a single reviewer to perform the literature search constitutes a limitation. Despite taking particular care to conduct associated processes as reliably as possible, we would still like to highlight this as a caveat to readers. Of course, it can also not be denied that this meta-analysis inadvertently included studies which are methodologically diverse and exhibit varying degrees of risk of bias. Furthermore, reported associations between attachment and paranoia were notably variable across studies, as indicated by the high levels of heterogeneity in our analyses ($I^2 > 75\%$). While this is not a rare phenomenon (Higgins, 2008), the underlying reasons likely warrant further research.

5. Conclusion

The link between paranoia and attachment has been a topic of interest for more than a decade. Drawing on 26 studies, the present meta-analysis is the first to provide an estimate of this relationship. Results showed that paranoia is associated with both attachment anxiety and attachment avoidance. The strength of these associations is similar for those in the general population and those with psychosis. While several limitations require caution in drawing conclusions, these findings suggest that attachment insecurity likely plays a contributory role in the presence of paranoia.

References

- *Ascone, L., Schlier, B., Sundag, J., & Lincoln, T.M. (2019). Pathways from insecure attachment dimensions to paranoia: The mediating role of hyperactivating emotion regulation versus blaming others. *Psychology and Psychotherapy: Theory, Research and Practice*. doi: 10.1111/papt.12208. [Epub ahead of print]
- Bakermans-Kranenburg, M.J., & van IJzendoorn, M.H. (2009). The first 10,000 Adult Attachment Interviews: distributions of adult attachment representations in clinical and non-clinical groups. *Attachment & Human Development*, 11, 223–263. doi: 10.1080/14616730902814762.
- Bartholomew, K., & Horowitz, L.M. (1991). Attachment styles among young adults: A test of a four - category model. *Journal of Personality and Social Psychology*, 61, 226-244. doi: 10.1037/0022-3514.61.2.226
- Bell, M., Fiszdon, J., Richardson, R., Lysaker, P., & Bryson, G. (2007). Are self-reports valid for schizophrenia patients with poor insight? Relationship of unawareness of illness to psychological self-report instruments. *Psychiatry Research*, 151, 37–46. doi: 10.1016/j.psychres.2006.04.012

Bentall, R.P., & Fernyhough, C. (2008). Social predictors of psychotic experiences: specificity and psychological mechanisms. *Schizophrenia Bulletin*, 34, 1012-1020. doi: 10.1093/schbul/sbn103

Bentall, R.P., Rowse, G., Shryane, N., Kinderman, P., Howard, R., Blackwood, N., ... Corcoran, R. (2009). The Cognitive and Affective Structure of Paranoid Delusions. *Archives of General Psychiatry*, 66, 236- 247. doi: 10.1001/archgenpsychiatry.2009.1

Bentall, R.P., de Sousa, P., Varese, F., Wickham, S., Sitko, K., Haarmans, M., & Read, J. (2014). From adversity to psychosis: Pathways and mechanisms from specific adversities to specific symptoms. *Social Psychiatry and Psychiatric Epidemiology*, 49, 1011-1022. doi: 10.1007/s00127-014-0914-0

Berry, K., Barrowclough, C., & Wearden, A. (2007). A review of the role of adult attachment style in psychosis: Unexplored issues and questions for further research. *Clinical Psychology Review*, 27, 458–475. doi: 10.1016/j.cpr.2006.09.006

*Berry, K., Barrowclough, C., & Wearden, A. (2008). Attachment theory: A framework for understanding symptoms and interpersonal relationships in psychosis. *Behaviour Research and Therapy*, 46, 1275–1282. doi: 10.1016/j.brat.2008.08.009

Berry, K., Danquah, A.N., & Wallin, D. (2014). Introduction. In A.N. Danquah & K. Berry (Eds.), *Attachment Theory in Adult Mental Health: A Guide to Clinical Practice* (pp. 3-15). New York, NY: Routledge.

*Berry, K., Wearden, A., Barrowclough, C., & Liversidge, T. (2006). Attachment styles, interpersonal relationships and psychotic phenomena in a non-clinical student sample. *Personality and Individual Differences*, 41, 707–718. doi: 10.1016/j.paid.2006.03.009

Borenstein, M., Hedges, L.V., Higgins, J.P.T., & Rothstein, H.R. (2010). A basic introduction to fixed-effect and random-effects models for meta-analysis. *Research Synthesis Methods*, 1, 97–111. doi: 10.1002/jrsm.12

Brennan, K.A., Clark, C.L., & Shaver, P.R. (1998). Self-report measurement of adult romantic attachment: An integrative overview. In J.A. Simpson & W.S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 46–76). New York, NY: Guilford.

Bretherton, I., & Munholland, K.A. (2008). Internal working models in attachment relationships: Elaborating a central construct in attachment theory. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of Attachment: Theory, Research, and Clinical Applications* (pp. 102-127). New York, NY: The Guilford Press.

Campbell, L., & Marshall, T. (2011). Anxious Attachment and Relationship Processes: An Interactionist Perspective. *Journal of Personality*, 79, 1219–1250. doi: 10.1111/j.1467-6494.2011.00723.x

Carr, S. C., Hardy, A., & Fornells-Ambrojo, M. (2018). Relationship between attachment style and symptom severity across the psychosis spectrum: A meta-analysis. *Clinical Psychology Review*, 59, 145–158. doi: 10.1016/j.cpr.2017.12.001

*Castilho, P., Martins, M. J., Pinto, A. M., Viegas, R., Carvalho, S., & Madeira, N. (2017). Understanding the effect of attachment styles in paranoid ideation: The mediator role of experiential avoidance. *Journal of Contextual Behavioral Science*, 6, 42–46. doi: 10.1016/j.jcbs.2016.11.007

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Coid, J.W., Ullrich, S., Kallis, C., Keers, R., Barker, D., Cowden, F., & Stamps, R. (2013). The relationship between delusions and violence: findings from the East London first episode psychosis study. *JAMA Psychiatry*, 70, 465-471. doi: 10.1001/jamapsychiatry.2013.12

Collins, N.L., & Feeney, B.C. (2004). Working Models of Attachment Shape Perceptions of Social Support: Evidence From Experimental and Observational Studies. *Journal of Personality and Social Psychology*, 87, 363–383. doi: 10.1037/0022-3514.87.3.363

Cozzarelli, C., Karafa, J.A., Collins, N.L., & Tagler, M.J. (2003). Stability and change in adult attachment styles: Associations with personal vulnerabilities, life events, and global construals of self and others. *Journal of Social and Clinical Psychology*, 22, 315-346. doi: 10.1521/jscp.22.3.315.22888

*Darrell-Berry, H., Bucci, S., Palmier-Claus, J., Emsley, R., Drake, R., & Berry, K. (2017). Predictors and mediators of trait anger across the psychosis continuum: The role of attachment style, paranoia and social cognition. *Psychiatry Research*, 249, 132–138. doi: 10.1016/j.psychres.2017.01.007

Derogatis, L.R. (1997). SCL-90: Administration, scoring and procedures manual-I for the (revised) version and other instruments of the psychopathology rating scale series. Baltimore, MD: Clinical Psychometrics Research Unit, Johns Hopkins University School of Medicine.

*Dunne, C. (2011). *The Association between Attachment and Schizotypy*. Unpublished doctoral dissertation, University of Edinburgh.

Egger, M., Smith, G.D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *British Medical Journal*, 315, 629–634. doi: 10.1136/bmj.315.7109.629

Elahi, A., Perez Algorta, G., Varese, F., McIntyre, J.C., & Bentall, R.P. (2017). Do paranoid delusions exist on a continuum with subclinical paranoia? A multi-method taxometric study. *Schizophrenia Research*, 190, 77-81. doi: 10.1016/j.schres.2017.03.022

- Ellett, L., Kingston, J., & Chadwick, P. (2018). State paranoia and urban cycling. *Psychiatry Research*, 266, 341-344. doi:10.1016/j.psychres.2018.03.035
- Feeney, J.A., Noller, P., & Hanrahan, M. (1994). Assessing adult attachment. In M. B. Sperling & W.H. Berman (Eds.), *Attachment in adults: clinical and developmental perspectives* (pp. 122–158). New York, NY: Guilford.
- Fenigstein, A., & Venable, P.A. (1992). Paranoia and self-consciousness. *Journal of Personality and Social Psychology*, 62, 129-138. doi: 10.1037//0022-3514.62.1.129
- *Fish, S. (2010). *The Association between Childhood Experiences of Parental Neglect and Antipathy, Schemas, Adult Attachments and Positive Symptoms of Psychosis*. Unpublished doctoral dissertation, University of East Anglia.
- *Fornells-Ambrojo, M., Elenbaas, M., Barker, C., Swapp, D., Navarro, X., Rovira, A., ... Slater, M. (2016). Hypersensitivity to Contingent Behavior in Paranoia. *The Journal of Nervous and Mental Disease*, 204, 148–152. doi: 10.1097/NMD.0000000000000414
- Fraley, R.C., Heffernan, M.E., Vicary, A.M., & Brumbaugh, C.C. (2011). The Experiences in Close Relationships-Relationship Structures questionnaire: A method for assessing attachment orientations across relationships. *Psychological Assessment*, 23, 615-625. doi: 10.1037/a0022898
- Fraley, R.C., & Shaver, P.R. (2000). Adult romantic attachment: Theoretical developments, emerging controversies, and unanswered questions. *Review of General Psychology*, 4, 132-154. doi: 10.1037/1089-2680.4.2.132
- Fraley, R.C., Waller, N.G., & Brennan, K.A. (2000). An item response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology*, 78, 350–365. doi: 10.1037/0022-3514.78.2.350
- Freeman, D., Dunn, G., Fowler, D., Bebbington, P., Kuipers, E., Emsley, R., ... Garety, P. (2013). Current Paranoid Thinking in Patients With Delusions: The Presence of Cognitive-Affective Biases. *Schizophrenia Bulletin*, 39, 1281–1287. doi: 10.1093/schbul/sbs145
- Freeman, D., & Garety, P.A. (2000). Comments on the content of persecutory delusions: Does the definition need clarification? *British Journal of Clinical Psychology*, 39, 407-414. doi: 10.1348/014466500163400
- Freeman, D. & Garety, P.A. (2014). Advances in understanding and treating persecutory delusions: a review. *Social Psychiatry and Psychiatric Epidemiology*, 49, 1179-1189. doi: 10.1007/s00127-014-0928-7
- Freeman, D., Garety, P.A., Bebbington, P.E., Smith, B., Rollinson, R., Fowler, D., ... Dunn, G. (2005). Psychological investigation of the structure of paranoia in a non-clinical population. *The British Journal of Psychiatry*, 186, 427-435. doi: 10.1192/bjp.186.5.427

- Freeman, D., Loe, B.S., Kingdon, D., Startup, H., Molodynski, A., Rosebrock, L., ... Bird, J. (2019). The revised Green et al., Paranoid Thoughts Scale (R-GPTS): psychometric properties, severity ranges, and clinical cut-offs. *Psychological Medicine* 1–10. doi: 10.1017/S0033291719003155
- Freeman, D., McManus, S., Brugha, T., Meltzer, H., Jenkins, R., & Bebbington, P. (2011). Concomitants of paranoia in the general population. *Psychological Medicine*, 41, 923-936. Doi: 10.1017/S0033291710001546
- Green, C.E.L., Freeman, D., Kuipers, E., Bebbington, P., Fowler, D., Dunn, G., & Garety, P.A. (2008). Measuring ideas of persecution and social reference: the Green et al. Paranoid Thought Scales (GPTS). *Psychological Medicine*, 38, 101-111. doi:10.1017/s0033291707001638
- Griffin, D.W., & Bartholomew, K. (1994). Models of the self and other: Fundamental dimensions underlying measures of adult attachment. *Journal of Personality and Social Psychology*, 67, 430-445. doi: 10.1037/0022-3514.67.3.430
- Gumley, A.I., Taylor, H.E., Schwannauer, M., & MacBeth, A. (2014). A systematic review of attachment and psychosis: Measurement, construct validity and outcomes. *Acta Psychiatrica Scandinavica*, 129, 257–274. doi: 10.1111/acps.12172
- Hajdúk, M., Klein, H.S., Harvey, P.D., Penn, D.L., & Pinkham, A.E. (2018). Paranoia and interpersonal functioning across the continuum from healthy to pathological - Network analysis. *British Journal of Clinical Psychology*, 58, 19-34. doi: 10.1111/bjc.12199
- Hazan, C., & Shaver, P. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology*, 52, 511–524. doi: 10.4324/9781351153683-17
- Hedges, L.V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. Orlando, FL: Academic Press.
- Higgins, J.P.T. (2008). Commentary: Heterogeneity in meta-analysis should be expected and appropriately quantified. *International Journal of Epidemiology*, 37, 1158–1160. doi: 10.1093/ije/dyn204
- Higgins, J.P.T. and Green, S. (2011). *Cochrane Handbook for Systematic Reviews of Interventions*. Version 5.1.0. The Cochrane Collaboration. Accessed at <http://handbook-5-1.cochrane.org>
- Higgins, J., & Thompson, S.G. (2002). Quantifying heterogeneity in a meta-analysis. *Statistics in Medicine*, 21, 1539–1558. doi: 10.1002/sim.1186
- Hodgekins, J., Coker, S., Freeman, D., Ray-Glover, K., Bebbington, P., Garety, P., ... Fowler, D. (2012). Assessing Levels of Subthreshold Psychotic Symptoms in the

Recovery Phase: The Schizotypal Symptoms Inventory (SSI). *Journal of Experimental Psychopathology*, 3, 582-593. doi:10.5127/jep.021211

Hunter, J.E., & Schmidt, F.L. (2004). *Methods of Meta-Analysis: Correcting Error and Bias in Research Findings (2nd ed.)*. Thousand Oaks, CA: Sage.

*Hutton, J., Ellett, L., & Berry, K. (2017). Adult attachment and paranoia: an experimental investigation. *The Cognitive Behaviour Therapist*, 10, e4. doi: 10.1017/S1754470X17000058

*James, G. (2015). *Using Working Models of Attachment to Understand Paranoia in the General Population*. Unpublished doctoral dissertation, University College London.

Johns, L.C., Cannon, M., Singleton, N., Murray, R.M., Farrell, M., Brugha, T., & ... Meltzer, H. (2004). Prevalence and correlates of self-reported psychotic symptoms in the British population. *British Journal of Psychiatry*, 185, 298-305. doi: 10.1192/bjp.185.4.298

*Jones, J.E. (2015). *The role of attachment, emotion regulation and recovery style in psychosis*, Unpublished doctoral dissertation, University of Birmingham.

Kay, S.R., Fiszbein, A., & Opler, L.A. (1987). The positive and negative syndrome scale (PANSS) for schizophrenia. *Schizophrenia Bulletin*, 13, 261-276. doi: 10.1093/schbul/13.2.261

Korver-Nieberg, N., Berry, K., Meijer, C., & de Haan, L. (2014). Adult attachment and psychotic phenomenology in clinical and non-clinical samples: A systematic review. *Psychology and Psychotherapy: Theory, Research and Practice*, 87, 127–154. doi: 10.1111/papt.12010

*Korver-Nieberg, N., Fett, A.K.J., Meijer, C.J., Koeter, M.W., Shergill, S.S., de Haan, L., & Krabbendam, L. (2013). Theory of mind, insecure attachment and paranoia in adolescents with early psychosis and healthy controls. *Australian and New Zealand Journal of Psychiatry*, 47, 737–745. doi: 10.1177/0004867413484370

Larose, S., & Bernier, A. (2001). Social support processes: Mediators of attachment state of mind and adjustment in late adolescence. *Attachment and Human Development*, 3, 96-120. doi: 10.1080/14616730010024762

Lavin, R., Bucci, S., Varese, F., & Berry, K. (2019). The relationship between insecure attachment and paranoia in psychosis: A systematic literature review. *British Journal of Clinical Psychology*. doi: 10.1111/bjc.12231 [Epub ahead of print]

*MacBeth, A., Schwannauer, M., & Gumley, A. (2008). The association between attachment style, social mentalities, and paranoid ideation: An analogue study. *Psychology and Psychotherapy*, 81, 79–93. doi: 10.1348/147608307X246156

- *Meins, E., Jones, S.R., Fernyhough, C., Hurndall, S., & Koronis, P. (2008). Attachment dimensions and schizotypy in a non-clinical sample. *Personality and Individual Differences*, 44, 1000–1011. doi: 10.1016/j.paid.2007.10.026
- Melo, S., Corcoran, R., Shryane, N., & Bentall, R.P. (2009). The persecution and deservedness scale. *Psychology and Psychotherapy: Theory, Research and Practice*, 82, 247-260. doi: 10.1348/147608308x398337
- Mikulincer, M. (1995). Attachment style and the mental representation of the self. *Journal of Personality and Social Psychology*, 69, 1203-1215. doi: 10.1037/0022-3514.69.6.1203
- Mikulincer, M. & Shaver, P.R. (2003). The attachment behavioral system in adulthood: Activation, psychodynamics, and interpersonal processes. *Advances in Experimental Social Psychology*, 35, 53-152. doi: 10.1016/S0065-2601(03)01002-5
- Mikulincer, M., & Shaver, P.R. (2007). *Attachment in Adulthood: Structure, Dynamics, and Change*. New York, NY: Guilford Press.
- Mikulincer, M., & Shaver, P.R. (2012). An attachment perspective on psychopathology. *World Psychiatry*, 11, 11-15. doi: 10.1016/j.wpsyc.2012.01.003
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D.G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Annals of Internal Medicine*, 151, 264–269. doi: 10.1371/journal.pmed.1000097
- *Newman-Taylor, K., Kemp, A., Potter, H., & Au-Yeung, S.K. (2017). An Online Investigation of Imagery to Attenuate Paranoia in College Students. *Journal of Child and Family Studies*, 27, 853–859. doi: 10.1007/s10826-017-0934-y
- Nieminen, P., Lehtiniemi, H., Vähäkangas, K., Huusko, A., & Rautio, A. (2013). Standardised regression coefficient as an effect size index in summarising findings in epidemiological studies. *Epidemiology Biostatistics and Public Health*, 10(4), 4–15. doi: 10.2427/8854
- van Os, J., Hanssen, M., Bijl, R.V., & Ravelli, A. (2000). Strauss (1969) revisited: a psychosis continuum in the general population? *Schizophrenia Research*, 45, 11–20. doi: 10.1016/s0920-9964(99)00224-8
- *Osswald, K. (2010). *What are they up to? Developmental pathways of paranoid thinking: an analogue study*. Unpublished doctoral dissertation, University of Glasgow.
- Pascuzzo, K., Moss, E., & Cyr, C. (2015). Attachment and Emotion Regulation Strategies in Predicting Adult Psychopathology. *SAGE Open*, 5(3), 1-15. doi: 10.1177/2158244015604695

*Pearce, J., Simpson, J., Berry, K., Bucci, S., Moskowitz, A., & Varese, F. (2017). Attachment and dissociation as mediators of the link between childhood trauma and psychotic experiences. *Clinical Psychology & Psychotherapy*, 24, 1304–1312. doi: 10.1002/cpp.2100

Pereg, D., & Mikulincer, M. (2004). Attachment Style and the Regulation of Negative Affect: Exploring Individual Differences in Mood Congruency Effects on Memory and Judgment. *Personality and Social Psychology Bulletin*, 30, 67–80. doi: 10.1177/0146167203258852

*Pickering, L., Simpson, J., & Bentall, R.P. (2008). Insecure attachment predicts proneness to paranoia but not hallucinations. *Personality and Individual Differences*, 44, 1212–1224. doi: 10.1016/j.paid.2007.11.016

Pietromonaco, P.R., & Barrett, L.F. (2000). The internal working models concept: What do we really know about the self in relation to others? *Review of General Psychology*, 4, 155–175. doi: 10.1037/1089-2680.4.2.155

Pinkham, A. E., Harvey, P. D., & Penn, D. L. (2016). Paranoid individuals with schizophrenia show greater social cognitive bias and worse social functioning than non-paranoid individuals with schizophrenia. *Schizophrenia Research: Cognition*, 3, 33–38. doi: 10.1016/j.scog.2015.11.002

*Ponizovsky, A.M., Vitenberg, E., Baumgarten-Katz, I., & Grinshpoon, A. (2013). Attachment styles and affect regulation among outpatients with schizophrenia: Relationships to symptomatology and emotional distress. *Psychology and Psychotherapy: Theory, Research and Practice*, 86, 164–182. doi: 10.1111/j.2044-8341.2011.02054.x

Poulton, R., Caspi, A., Moffitt, T.E., Cannon, M., Murray, R., & Harrington, H. (2000). Children's Self-Reported Psychotic Symptoms and Adult Schizophreniform Disorder. *Archives of General Psychiatry*, 57, 1053-1058. doi: 10.1001/archpsyc.57.11.1053

Raihani, N.J., & Bell, V. (2017). Paranoia and the social representation of others: a large-scale game theory approach. *Scientific Reports*, 7, 4544. doi: 10.1038/s41598-017-04805-3

Raine, A. (1991). The SPQ: A scale for the assessment of schizotypal personality based on DSM-III-R criteria. *Schizophrenia Bulletin*, 17, 556-564. doi: 10.1093/schbul/17.4.555

Rankin, P., Bentall, R., Hill, J., & Kinderman, P. (2005). Perceived Relationships with Parents and Paranoid Delusions: Comparisons of Currently Ill, Remitted and Normal Participants. *Psychopathology*, 38, 16–25. doi: 10.1159/000083966

Read, J., & Gumley, A. (2010). Can attachment theory help explain the relationship between childhood adversity and psychosis? In S. Benamer (Ed.), *Telling stories? Attachment-based approaches to the treatment of psychosis* (pp. 51-94). London, UK: Karnac Books Ltd.

Rupinski, M.T., & Dunlap, W.P. (1996). Approximating Pearson product-moment correlations from Kendall's tau and Spearman's rho. *Educational and Psychological Measurement*, 56, 419-429. doi: 10.1177/0013164496056003004

*Russo, D.A., Stochl, J., Hodgekins, J., Iglesias-González, M., Chipps, P., Painter, M., ... Perez, J. (2018). Attachment styles and clinical correlates in people at ultra high risk for psychosis. *British Journal of Psychology*, 109, 45–62. doi: 10.1111/bjop.12249

*Sheinbaum, T., Kwapil, T.R., & Barrantes-Vidal, N. (2014). Fearful attachment mediates the association of childhood trauma with schizotypy and psychotic-like experiences. *Psychiatry Research*, 220, 691–693. doi: 10.1016/j.psychres.2014.07.030

*Sitko, K., Bentall, R.P., Shevlin, M., & Sellwood, W. (2014). Associations between specific psychotic symptoms and specific childhood adversities are mediated by attachment styles: An analysis of the National Comorbidity Survey. *Psychiatry Research*, 217, 202–209. doi: 10.1016/j.psychres.2014.03.019

Sitko, K., Varese, F., Sellwood, W., Hammond, A., & Bentall, R. (2016). The dynamics of attachment insecurity and paranoid thoughts: An experience sampling study. *Psychiatry Research*, 246, 32-38. Doi: 10.1016/j.psychres.2016.08.057

*Smailes, D. (2014). *Parental bonding, attachment, reality discrimination, and psychotic-like experiences*. Unpublished doctoral thesis, Durham University.

Solomon, Z., Dekel, R., & Mikulincer, M. (2008). Complex trauma of war captivity: a prospective study of attachment and post-traumatic stress disorder. *Psychological Medicine*, 38, 1427–1434. doi: 10.1017/S0033291708002808

Sroufe, L.A., Egeland, B., Carlson, E.A., & Collins, W.A. (2005). *The development of the person: The Minnesota study of risk and adaptation from birth to adulthood*. New York, NY: Guilford Publications.

Stefanis, N.C., Hanssen, M., Smirnis, N.K., Avramopoulos, D.A., Evdokimidis, I.K., Stefanis, C.N., ... van Os, J. (2002). Evidence that three dimensions of psychosis have a distribution in the general population. *Psychological Medicine*, 32, 347–358. doi: 10.1017/S0033291701005141.

Sterne, J.A., & Egger, M. (2001). Funnel plots for detecting bias in meta-analysis: guidelines on choice of axis. *Journal of Clinical Epidemiology*, 54, 1046–1055. doi: 10.1016/s0895-4356(01)00377-8

*Strand, J., Goulding, A., & Tidefors, I. (2015). Attachment styles and symptoms in individuals with psychosis. *Nordic Journal of Psychiatry*, 69, 67–72. doi: 10.3109/08039488.2014.929740

Strauss, J.S. (1969). Hallucinations and Delusions as Points on Continua Function. *Archives of General Psychiatry*, 21(5), 581-586. doi: 10.1001/archpsyc.1969.01740230069010

Taylor, J.L., & John, C.H. (2004). Attentional and memory bias in persecutory delusions and depression. *Psychopathology*, 37, 233-241. doi: 10.1159/000080719

Taylor, P.J., Rietzschel, J., Danquah, A.N., & Berry, K. (2015). The role of attachment style, attachment to therapist and working alliance in response to psychological therapy. *Psychology and Psychotherapy: Theory, research and practice*, 88, 240-253. doi: 10.1111/papt.12045.

*Tiliopoulos, N., & Goodall, K. (2009). The neglected link between adult attachment and schizotypal personality traits. *Personality & Individual Differences*, 47, 299-304. doi: 10.1016/j.paid.2009.03.017

Valmaggia, L.R., Day, F.L., Kroll, J., Laing, J., Byrne, M., Fusar-Poli, P., & McGuire, P. (2015). Bullying victimisation and paranoid ideation in people at ultra high risk for psychosis. *Schizophrenia Research*, 168, 68-73. doi: 10.1016/j.schres.2015.08.029

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software*, 36, 1–48. doi: 10.18637/jss.v036.i03

*Wickham, S., Sitko, K., & Bentall, R. P. (2015). Insecure attachment is associated with paranoia but not hallucinations in psychotic patients: The mediating role of negative self-esteem. *Psychological Medicine*, 45, 1495–1507. doi: 10.1017/S0033291714002633.

Wilcox, J., Briones, D., Quadri, S., & Tsuang, M. (2014). Prognostic implications of paranoia and thought disorder in new onset psychosis. *Comprehensive Psychiatry*, 55, 813–817. doi: 10.1016/j.comppsy.2013.12.010

Williams, J., Plassman, B., Burke, J., Holsinger, T., & Benjamin, S. (2010). *Preventing Alzheimer's disease and cognitive decline*. (Vol. Evidence Report/Technology Assessment No. 193.). Rockville: Agency for Healthcare Research and Quality.

Wittchen, H.U., & Kessler, R.C. (1994). Modifications of the CIDI in the National Comorbidity Survey: The Development of the UM-CIDI. NCS Working Paper No.2. Accessed at <http://www.hcp.med.harvard.edu/ncs/ftpdir/um-cidi.pdf>

***study was synthesised in meta-analysis**

Chapter 2

From the lonely to the paranoid? Testing the role of loneliness in the development of paranoia

Loneliness in the Development of Paranoia

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Abstract

Objectives Even though loneliness and paranoia are known to be associated, the nature and direction of this relationship is still unclear. This study investigated whether the experience of increased loneliness can contribute to the development of increased paranoia. **Design** To do so, we employed an experimental procedure to induce loneliness and tracked changes in paranoia in a community sample of 80 N. The hypotheses and methodology of this study were pre-registered on AsPredicted. **Methods** The loneliness induction was based on the procedure used by another research group (Lamster et al., 2017) and was carried out in three stages. Firstly, participants wrote a short paragraph about an experience of being excluded. Then they filled in a modified version of the UCLA Loneliness Scale, designed to elicit endorsement of items. Lastly, participants received false feedback on their scores, indicating that their level of loneliness was very high. **Results** In line with the Lamster study, we observed a moderate loneliness increase from pre to post assessment ($p = .002$). The loneliness induction was only effective in less than half of our sample however. Contrary to expectations, we noted a large paranoia decrease from pre to post assessment ($p = .000$). Nevertheless, regression analysis indicated that loneliness and paranoia did covary ($\beta = .4722$, $p = .018$). **Conclusions** Although some of our findings are unexpected, our results point towards a possible relationship between loneliness and paranoia. The methodological limitations of this study are discussed in detail. **Keywords** Loneliness, Paranoia, Psychosis, Experiment

Practitioner Points

- loneliness induction worked for only 45% of sample and needs further refinement
- experimental paradigm used in this study had several methodological limitations
- however, findings indicate that loneliness and paranoia covaried in our sample
- link between loneliness and paranoia is also supported by other recent research
- further replication of similar findings is required, especially in psychosis samples

The data that support the findings of this study are available from the authors upon request.

1. Introduction

Loneliness is a subjective state which is experienced as emotionally unpleasant (Cacioppo et al., 2006). It typically arises when existing relationships fall somehow short of what an individual desires (Cacioppo & Cacioppo, 2018). This can occur regardless of how large a social network is or how frequently one interacts with it (Hawkley et al., 2008). Studies suggest that the prevalence of loneliness in psychosis is outstandingly high, e.g. in an Australian national survey of 1825 adults with psychosis, 80% of the sample reported having felt lonely in the preceding year (Stain et al., 2012). As epidemiological data from the UK also indicate, the odds of experiencing loneliness across the lifespan are nearly 6 times greater for those living with psychosis than the general population (Meltzer et al., 2013).

Paranoia is thought to occur on a phenomenological continuum, ranging from mild concerns about others' intentions to more severe delusions of persecution (Bebbington et al., 2013). A number of studies have investigated links between paranoia and loneliness, both in samples comprised of the general population and those with psychosis (e.g. Kimhy et al., 2006; Sündermann et al., 2014). A recent meta-analysis synthesised this corpus of evidence, concluding that the relationship between both experiences is moderate ($r = .45$, Chau, Zhu & So, 2019). While these findings certainly provide an indication of its magnitude, the precise nature of the loneliness-paranoia link remains unclear. For the most part, loneliness has been thought to develop as one of many sequelae of living with psychosis symptoms (Gayer-Anderson & Morgan, 2013). This may be particularly likely in the case of paranoia, e.g. if others are perceived as threatening, individuals may keep themselves safe by withdrawing and thus see relationships deteriorate over time (Freeman, Garety, Kuipers, Fowler & Bebbington, 2002). According to more recent considerations however, loneliness may also precede the onset of psychosis symptoms and perhaps promote their development, e.g. earlier loneliness was found to be associated with later paranoia in the general population (Lim, Rodebaugh, Zyphur, & Gleeson, 2016). This could occur through a range of mechanisms, e.g. a recent review highlighted that lonely individuals tend to be hypervigilant in social situations, view themselves negatively and attribute hostile intent to others (Spithoven, Bijttebier, & Goossens, 2017). Such propensities are likely to foster ideas of others as threatening, especially if these are experienced on a chronic basis (Hawkley & Cacioppo, 2010; Vanhalst et al., 2015). It is also of note that these are central components in models of paranoia and thus denote a potential area of overlap with loneliness (Garety, Kuipers, Fowler, Freeman, & Bebbington, 2001; Freeman & Garety, 2014).

Despite clear conceptual links, research examining loneliness as contributory in the development of paranoia has been scarce. The first study to directly test this hypothesis was indeed conducted only recently (Lamster et al., 2017). Using a general population sample, it set out to investigate whether changes in loneliness could prompt changes in paranoia. In one of three experimental conditions, a total of

18 participants underwent a procedure in which their level of loneliness was increased. Due to insufficient power ($1-\beta = .71$), its impact on paranoia could not be conclusively determined, with findings emerging to be at trend level only. In order to address the above limitations, the present study aimed to replicate this part of the Lamster experiment with a notably larger participant sample. To expand on previous work, trait anxiety was also included as a moderator variable. As noted above, anticipation of harm is characteristic of paranoia, defining it as an experience driven by threat beliefs (Freeman et al., 2002; Garety & Freeman, 2013). This conceptualisation likens paranoia to more common anxiety presentations and points towards the role of anxious arousal in its etiology. In view of this, the impact of loneliness on paranoia may vary across individuals with different trait anxiety levels (Lim, Gleeson, Alvarez-Jimenez & Penn, 2018). Overall, the present study aimed to

- 1) determine whether a procedure based on that used by Lamster and colleagues can induce increased loneliness in a larger participant sample, recruited in the UK;
- 2) establish whether induction of increased loneliness is associated with increased paranoia when statistical analyses are sufficiently powered, at no less than 80%;
- 3) investigate whether the relationship between loneliness and paranoia is moderated by trait anxiety, after age and sex are controlled for.

2. Methodology

2.1 Registration & Power Analysis

To reduce risk of bias, the study methodology was pre-registered on AsPredicted (registration 24240; see Appendix F). As a recent meta-analysis reported a moderate association ($r = .45$) between loneliness and paranoia, an effect of similar size was anticipated (Chau, Zhu & So, 2019). Based on an a priori power analysis conducted in G*Power version 3.1, a minimum sample size of $N = 78$ was required to detect the above in a moderation analysis (i.e. as per research question 3, given five predictors in the final regression model, 80% power and $\alpha = .05$). This study received ethical approval from the University of Edinburgh Department of Clinical and Health Psychology Ethics Research Panel (reference number CLIN565; Appendix E).

2.2 Participant Recruitment

A total of 80 participants were recruited through advertisements in posters, mass emails, and social media platforms. In line with Lamster and colleagues, the study purpose was masked by advertising it as a study aimed at piloting a questionnaire. Participants did not receive any reimbursement, but had the opportunity to opt into a prize draw for three £30 gift vouchers. As we aimed to recruit non-clinical adults, volunteers were required to (1) be at least 18 years old; (2) not have a psychiatric diagnosis defined as enduring, such as Schizophrenia or a Personality Disorder; and (3) not currently be in receipt of mental health treatment. Screening for these criteria was conducted via a questionnaire and hence relied on participant self-report.

2.3 Experimental Procedure

As shown in Figure 1, the present study largely replicated the experimental procedure used by Lamster and colleagues to induce loneliness. Upon arrival, participants completed a set of baseline questionnaires capturing demographic data, trait anxiety, paranoia and loneliness. Following this, the loneliness induction was carried out in a three-stage process. Firstly, participants were asked to write a short paragraph about a personal experience of feeling left out or excluded. This writing task differed from the one used in the Lamster study; its content and timing were designed to enhance the impact of subsequent steps by priming participants. Secondly, participants were asked to complete a modified version of the UCLA Loneliness Scale, labelled “pilot questionnaire” (Russell, Peplau, & Cutrona, 1980). It consisted of 20 items rated on a 4-point Likert scale from 0 = *never* to 3 = *often*. To elicit endorsement of items, the word *sometimes* was added to these, e.g. “I feel completely alone sometimes” or “I sometimes have nobody to talk to”. Thirdly, participants received false feedback during which their total score on above “pilot questionnaire” was revealed to be very elevated compared to fictional norms. The script used for this was taken from Lamster and colleagues as *“Compared to 1800 people of your age, gender and educational level this represents an extremely high loneliness score. That means that only 17% of the comparison group is lonelier than you. Compared to you, the majority is more satisfied with their level of social contacts, friends and loved ones.”* Following this, the assessment of paranoia and loneliness was repeated. Before departing participants were debriefed on the purpose of the study, received a break-down of the experimental procedure, and watched a short upbeat video. In total, the experimental procedure lasted approximately 40 to 50 minutes. To ensure that the loneliness induction was effective, it was piloted with a sample of 34 participants; a priori power calculations determined that this sample size would be sufficient to detect a moderate effect at 80% power and $\alpha = .05$. Pilot findings indicated that post-induction loneliness levels were significantly higher than pre-induction loneliness levels ($p = .004$).

2.4 Measures

Paranoia. Consistent with Lamster and colleagues, paranoia was assessed using the Paranoia Checklist, an 18-item measure which is suitable for general population samples (PCL; Freeman et al., 2005). Its items span the paranoia continuum from mild to severe, e.g. ranging from “strangers and friends look at me critically” to “there is a possibility of a conspiracy against me”. Items are rated on a 5-point Likert scale from 1 = *not at all* to 5 = *very strongly*. The original version of the PCL is reported to have excellent internal consistency ($\alpha > .90$) and is highly correlated with other paranoia measures, e.g. the Paranoia Scale (Fenigstein & Venable, 1992). In order to assess paranoia as a momentary state, the reference time of the PCL was changed to “right now” in the present study. To reduce the risk of memory effects and mask the construct of interest, PCL items were presented in a different order during each administration and included eight distractor questions.

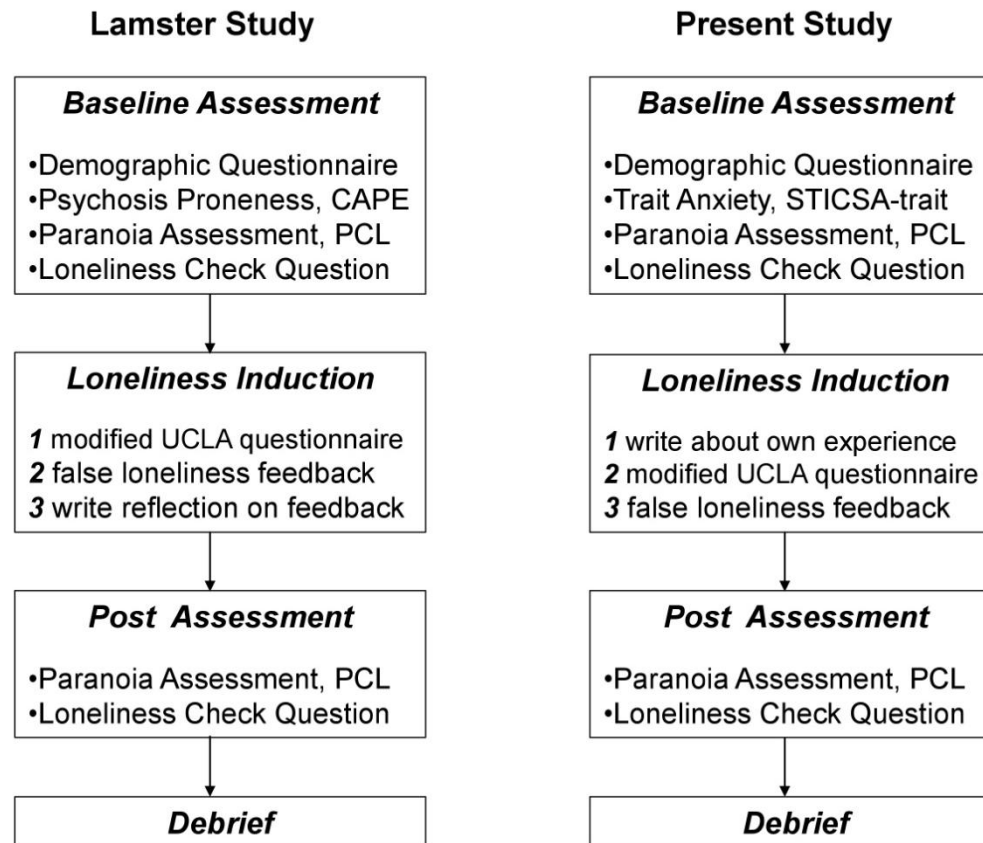


Figure 1. Breakdown of experimental procedure. The present study largely replicated the experimental procedure employed by Lamster and colleagues.

Loneliness. In line with Lamster and colleagues, loneliness was measured using the check item “Right now I feel a bit lonely” before and after induction. The item was rated on a 10-point Likert scale from *1 = I strongly disagree* to *10 = I strongly agree*. The use of a single item measure was suggested as the most straightforward assessment approach in previous research, e.g. as it is easy to administer and does not highlight loneliness as the main construct of interest in the same way an entire questionnaire would. To further mask the focus of the present study, the check item was presented among four distractor questions, e.g. “Right now I feel a bit tense” and “Right now I feel a bit excited”.

Trait Anxiety. Trait anxiety was assessed using the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA; Ree, French, MacLeod, & Locke, 2008). It consists of 21 items which cover different manifestations of trait anxiety, ranging from items such as “my muscles are tense” to “I think that the worst will happen”. These are rated on a 4-point Likert scale from *1 = almost never* to *4 = almost always*. In the present study, participants were asked to rate how often each statement was generally descriptive of them. While the STICSA was developed comparatively recently, it has excellent internal consistency ($\alpha > .91$) and is increasingly used in research (Elwood, Wolitzky-Taylor, & Olatunji, 2012).

2.5 Statistical Analyses

All statistical analyses were conducted in SPSS version 24 and largely followed those performed by Lamster. Descriptive statistics and correlations were computed for all measured variables. To assess whether the loneliness induction was effective in the total participant sample, pre-induction and post-induction scores on the loneliness check item were compared with Wilcoxon Signed Rank Test for related samples. The same analysis was performed to assess changes in paranoia.

To assess if trait anxiety moderated the relationship between loneliness change and paranoia change, multiple linear regression analysis was performed using the following model: **paranoia change = $\beta_0 + \beta_1$ (loneliness change) + β_2 (trait anxiety) + β_3 (loneliness change \times trait anxiety) + ϵ** ; where β_0 denotes the intercept and ϵ denotes error. If the interaction term within this model is found to be statistically significant, the presence of a moderation effect would be corroborated. The PROCESS macro plug-in for SPSS (Hayes, 2013) was used to investigate effects of loneliness change on paranoia change at three levels of trait anxiety, i.e. low (1SD below mean), medium (equal to mean) and high (1SD above mean). To reduce multicollinearity, both variables in the interaction term were centred.

To examine whether a moderation effect could still be identified if socio-demographic variables are controlled for, age and sex were added as covariates in a separate multiple linear regression analysis, using the following model: **paranoia change = $\beta_0 + \beta_1$ (age) + β_2 (sex) + β_3 (loneliness change) + β_4 (trait anxiety) + β_5 (loneliness change \times trait anxiety) + ϵ** .

3. Results

3.1 Descriptive Analyses

There was no missing data for any of the variables in the present study. Inspection of box plots also suggested that there were no extreme outliers. All variables were assessed for normality by inspecting histograms as well as the output from the Kolmogorov-Smirnov test. This indicated that all variables significantly deviated from the normal distribution. A correlation matrix for all variables can be found in Table 1.

3.2 Sample Characteristics

The present sample was comprised of almost 78% females and had a mean age of 28.3 years ($SD = 8.36$, range 18-65). Approximately 66% of participants were university students. In the present sample, 56% of participants were native English speakers; the remainder had various native languages. As indicated in Table 2, there were no differences on baseline variables when participants were compared on sex or language status using the Mann-Whitney U Test.

3.3 Loneliness Change

A mean comparison conducted using Wilcoxon Signed Ranked Test indicated that loneliness at pre-induction ($Mdn = 2.00$) and loneliness at post-induction ($Mdn = 3.00$) differed significantly ($z = 3.03$, $p = .002$). In line with our expectations, this finding suggested that the level of loneliness increased over the course of the experimental procedure, with an effect of moderate magnitude ($r = 0.34$). As loneliness only changed by approximately one point on the 10-point Likert scale however, the observed increase was still in the low range and thus likely not very meaningful.

3.4 Paranoia Change

A mean comparison conducted using Wilcoxon Signed Ranked Test revealed that paranoia at pre-induction ($Mdn = 23.50$) and paranoia at post-induction ($Mdn = 21.00$) also differed significantly ($z = -5.50$, $p = .000$). Contrary to our expectations however, this finding suggested that the level of paranoia decreased over the course of the experimental procedure, with an effect of large magnitude ($r = -0.62$).

3.5 Moderation Analyses

The analysis was performed using 5000 bootstrap samples and bias-corrected confidence intervals. As bootstrapping is a non-parametric approach, it is suitable for data which are not normally distributed. The first regression model was significant ($R^2 = .13$, $F(3, 76) = 3.84$, $p = .013$). As shown in Table 3, loneliness change was a significant predictor ($\beta = .4722$, $p = .018$) of paranoia change in the analysis. Trait anxiety did not seem to affect this relationship; the interaction term was not found to be significant ($\beta = .0450$) and its addition did not explain any significant change in R^2 ($\Delta R^2 = .023$, $p = .161$). When age and sex were controlled for in a second regression model, these results did not change. These findings suggest that trait anxiety did not moderate the association between paranoia change and loneliness change.

Table 1. Correlations of Key Variables (N = 80)

Variable	1	2	3	4	5	6	7
1. Trait Anxiety	-						
2. Loneliness Pre	.324**	-					
3. Loneliness Post	.456**	.586**	-				
4. Loneliness Change	.108	-.475**	.364**	-			
5. Paranoia Pre	.323**	.358**	.336**	-.025	-		
6. Paranoia Post	.311**	.221*	.350**	.143	.838**	-	
7. Paranoia Change	-.137	-.348**	-.155	.275*	-.678**	-.244*	-

Notes: All computed as Spearman's rs; *correlation is significant at .05 level (2-tailed); **correlation is significant at .01 level (2-tailed).

Table 2. Sample Characteristics across Variables

	Sample Mean (SD)	Sex Mean (Mdn, SD)		Native Language Mean (Mdn, SD)	
	Total N=80	Females N=62	Males N=18	English N=45	Other N=35
<i>Trait Anxiety</i> ¹	37.68 (8.60)	38.13 (36.00, 8.77)	36.11 (34.50, 8.01)	37.62 (35.00, 8.48)	37.74 (36.00, 8.87)
<i>Loneliness Pre</i> ²	3.28 (2.37)	3.11 (2.00, 2.40)	3.83 (3.00, 2.20)	3.47 (3.00, 2.30)	3.03 (2.00, 2.46)
<i>Loneliness Post</i>	3.98 (2.27)	3.89 (3.00, 2.35)	4.28 (4.50, 2.11)	4.13 (4.00, 2.39)	3.77 (3.00, 2.17)
<i>Paranoia Pre</i> ³	26.54 (8.42)	25.85 (22.50, 8.24)	28.89 (27.50, 8.87)	26.36 (23.00, 8.23)	26.77 (24.00, 8.79)
<i>Paranoia Post</i>	23.95 (6.88)	23.50 (21.00, 6.52)	25.50 (22.50, 7.99)	23.24 (20.00, 6.77)	24.86 (23.00, 7.00)

Notes: ¹no baseline differences across sex ($U = 490.00$, $z = -0.78$, $p = .43$) or language ($U = 791.00$, $z = 0.03$, $p = .97$);

²no baseline differences across sex ($U = 693.50$, $z = 1.60$, $p = .11$) or language ($U = 665.00$, $z = -1.22$, $p = .22$);

³no baseline differences across sex ($U = 718.50$, $z = 1.85$, $p = .06$) or language ($U = 834.50$, $z = 0.46$, $p = .65$);

Table 3. Results of Moderation Analysis

Parameter	B	SE	<i>t</i>	<i>p</i>	95% CI	
					Lower Bound	Upper Bound
Model Intercept	-2.6553	.3970	-6.6886	.000	-3.4459	-1.8646
Loneliness Change	.4722	.1953	2.4185	.018	.0833	.8611
Trait Anxiety	-.0857	.0470	-1.8235	.072	-.1793	.0079
Interaction [†]	.0450	.0318	1.4144	.161	-.0184	.1083

[†]Interaction (Loneliness Change x Trait Anxiety); 95% CI=Confidence Interval for model coefficients.

Table 4. Wilcoxon Signed Ranked Test for Paranoia Change

Subgroup	N	<i>z</i>	<i>p</i>	<i>r</i> [†]
Loneliness Increase	36	-2.333	.020	-0.40
Loneliness No Change	26	-3.907	.000	-0.77
Loneliness Decrease	18	-3.397	.001	-0.80

[†] effect size of pre-to-post paranoia decrease

3.6 Exploratory Analysis

We conducted unplanned analyses to examine specific patterns of changes in loneliness and paranoia; this seemed to be particularly important as the findings reported above clearly deviated from our predictions. An examination of data indicated that participants exhibited three different types of loneliness responses following the experimental procedure, i.e. loneliness increase, no loneliness change, and loneliness decrease. As shown in Table 4, mean comparisons revealed that paranoia decreased significantly in every of these subgroups, with effects of moderate to large magnitude.

4. Discussion

4.1 Loneliness Induction

Consistent with the Lamster publication, our findings initially seemed to suggest that the loneliness induction was effective in the present study. Despite a slight modification in our procedure, the magnitude of loneliness increase was identical to the one reported by above authors (i.e. $r = 0.34$). Even though this effect was statistically significant across our total sample, closer inspection revealed that only 45% of it responded in the expected manner. As this was somewhat unexpected, we re-examined our data to identify what may have differentiated these participants from others. We consequently compared responders ($N = 36$) to non-responders ($N = 44$) on demographic characteristics as well as baseline variables. Interestingly both

groups only differed with regard to loneliness ($U = 477.00$, $z = 3.04$, $p = .002$), with levels being significantly lower in those who responded ($Mdn = 2.00$) compared to those who did not ($Mdn = 4.00$). If this finding reflects a genuine difference in susceptibility to the present loneliness induction, it is unclear what the underlying mechanisms may be. All things considered, it is not unlikely that the procedure used here could yield different results upon replication in other samples. To make it more robust and improve its success rate, further refinement therefore seems to be necessary. To our knowledge, a number of other loneliness inductions have been used in previous studies. Many of these drew on participants' recall of personal experiences, but differed considerably in terms of procedure, e.g. ranging from use of simple recollection, to writing tasks, viewing of video material, and even hypnosis (e.g. Cacioppo et al., 2006; Epley, Akalis, Waytz, & Cacioppo, 2008; Hu, 2009). To advance the methods used in this field, it may be beneficial for future research to compare the effectiveness of the above in general population samples. As it stands, little is known about what the most reliable method of loneliness induction would be.

Although an effect was observed by us and Lamster, it is also debatable whether a genuine state of loneliness was induced in either study. It may be argued that a loneliness experience which is *evoked* cannot be phenomenologically equivalent to a loneliness experience which *arises*. To the best of our knowledge, this hypothesis has not been specifically tested in loneliness research so far. It is also of note that assessing loneliness by relying on the single item "Right now I feel a bit lonely" has inescapable limitations. Findings from qualitative research suggest that adults can have diverse conceptualisations of what it means to be "lonely" (e.g. Hauge & Kirkevold, 2010). In view of this, it is not unlikely for the above item to have prompted different interpretations. It may therefore be questionable whether it reliably assessed the same loneliness construct across our sample.

Another concern pertains to the repeated administration of the "Right now I feel a bit lonely" item. Even though reassessment of loneliness was necessary for our planned analyses, relying on participants' report may have introduced bias, e.g. by drawing attention to loneliness as an experience of interest to the researchers (see Hauser, Ellsworth & Gonzalez, 2018). This is particularly likely as loneliness was a somewhat salient theme, e.g. due to being highlighted in the writing task, modified UCLA questionnaire, and the false feedback (Figure 1). We can therefore not rule out that participants may have made guesses about the study purpose, with psychological processes set in motion by this skewing reporting of loneliness. Although the "Right now I feel a bit lonely" item was presented among four distractor questions, it is unlikely that this would have completely mitigated above risks. As highlighted in literature, these can sometimes be bypassed by using a more covert assessment approach, e.g. by tracking changes in behaviours or psychophysiology, which serve as proxy-measures of the experience researchers are hoping to induce (see Cacioppo, Tassinary & Berntson, 2017). In the case of loneliness however, it is not yet clear what these could pragmatically consist of within an experimental study.

4.2 Paranoia Change

Contrary to our expectations, we observed a significant paranoia decrease in the present study. It was difficult to make sense of this at first glance, especially as there was no intuitively convincing account of why this would occur. Further examination also revealed that the paranoia decrease was pervasive across our entire sample, i.e. it was large in magnitude and evident regardless of how participants responded to our loneliness induction (Table 4). Lamster and colleagues interestingly also reported a significant paranoia decrease in their control group, in which participants received neutral comments on an unmodified UCLA questionnaire and no loneliness change occurred. The authors hypothesised that this may have been attributable to habituation, due to which participants simply became more comfortable over the course of participation. While this may have been at play in our study to some extent, it is debatable whether a paranoia decrease as pronounced as the present one can be the sole result of an acclimatisation process. It therefore seems to be more likely that some element of our experimental procedure had a contributory role.

During a number of debrief conversations for example, participants reported being taken aback by the false feedback, e.g. as it was not congruent with their general experience, stood in contrast to how they wished to be perceived, or seemed disproportionate to what they indicated on the modified UCLA questionnaire. In all of these instances, participants admitted to becoming more cautious in how they responded on subsequent measures. It is conceivable that this may have happened with varying degrees of awareness across our sample. If this indeed played a role, the effect observed in the present study would merely reflect a change in reporting rather than a decrease in paranoia. Of course, we need to acknowledge that this is a speculative hypothesis and based on anecdotal evidence only. It is also of note that a control group is essential in attempting to interpret pre-to-post changes in any variable. In the present study, it would have been beneficial to test whether a paranoia decrease still occurred in the absence of one or more elements of our experimental procedure, e.g. the false feedback. In order to implement this adequately, a control group of more than 30 participants would have been necessary to repeat the means comparison at 80% power and $\alpha = .05$. Due to resource constraints and time limitations however, it was not feasible to recruit an additional sample of this size. This constitutes a significant methodological limitation and unfortunately prevents us from drawing more definitive conclusions about our data.

4.3 Regression Analysis

As outlined above, pre to post comparisons yielded some unexpected findings. Nevertheless, our results also showed that loneliness and paranoia were significantly correlated in our sample at both times of measurement (see Table 1). Furthermore, regression analysis indicated that loneliness change was statistically associated with paranoia change ($\beta = .4722$, $p = .018$). This is in line with prior research and suggests that both variables -as measured in the present study- covaried.

4.4 Other Limitations

Despite the issues highlighted above, a clear strength of the present study lies in its transparent reporting and by extension its reproducibility, e.g. the design would lend itself well to being replicated or refined in future research. However, a further limitation which we have not addressed so far pertains to the nature of our sample. In the field of psychosis research, it is common for studies to be conducted in the general population before participants who meet specific diagnostic criteria are recruited. This is appropriate, not least because it reduces participation burden for individuals who are already likely to experience distress. It is also suitable for probing mechanisms in single symptom psychosis research without common confounders, such as interference from comorbid hallucinations (see Bentall, 2014). It can nevertheless also be argued that our sample is not adequately representative of said general population, e.g. as it is predominantly comprised of women and more than half of participants were students. This obviously limits the generalisability of any conclusions we have been able to draw, regardless of how tentative these may be.

4.5 Recent Evidence

During our data collection process, a study which also aimed to replicate the trend level findings by Lamster was published (Gollwitzer, Wilczynska & Jaya, 2018). In one of three experimental conditions, these authors asked a general population sample of 222 adults to recall an experience of loneliness and re-enact it using mental imagery. As analysis indicated, this did not only elicit a significant increase in loneliness, but also led to a significant increase in paranoia. While several of the limitations outlined above also apply here, these findings clearly highlight that there is merit in continuing to consider a causal link between loneliness and paranoia.

5. Conclusion

While some of our findings were unexpected and limited by methodological shortcomings, our results indicate that loneliness and paranoia covaried. This is in line with recent research findings and provides further evidence of a possible relationship between both variables. As this area of research is presently in its early stages, these findings still require further replication, most pertinently in samples of individuals with psychosis.

References

- Aiken, L.S. & West, S.G. (1991). *Multiple Regression: Testing and Interpreting interactions*. Newbury Park: Sage.
- Bebbington, P. E., McBride, O., Steel, C., Kuipers, E., Radovanović, M., Brugha, T., ... Freeman, D. (2013). The structure of paranoia in the general population. *British Journal of Psychiatry*, 202, 419–427. doi:10.1192/bjp.bp.112.119032
- Bentall, R.P. (2014). The search for elusive structure: a promiscuous realist case for researching specific psychotic experiences such as hallucinations. *Schizophrenia Bulletin*, 40 Suppl 4(Suppl 4), S198–S201. doi:10.1093/schbul/sbu044
- Cacioppo, J.T., & Cacioppo, S. (2018). Loneliness in the modern age: An evolutionary theory of loneliness (ETL). *Advances in Experimental Social Psychology*, 58, 127-197. doi: 10.1016/bs.aesp.2018.03.003
- Cacioppo, J.T., Hawkley, L.C., Ernst, J.M., Burleson, M., Berntson, G.G., Nouriani, B., & Spiegel, D. (2006). Loneliness within a nomological net: An evolutionary perspective. *Journal of Research in Personality*, 40, 1054-1085. doi:10.1016/j.jrp.2005.11.007
- Cacioppo, J.T., Tassinary, L.G., & Berntson, G.G. (eds). (2017). *(Handbook) of Psychophysiology*. Cambridge: Cambridge University Press.
- Chau, A.K.C., Zhu, C., & So, S. H.W. (2019). Loneliness and the psychosis continuum: a meta-analysis on positive psychotic experiences and a meta-analysis on negative psychotic experiences. *International Review of Psychiatry*, 1 20. doi:10.1080/09540261.2019.1636005
- Elwood, L.S., Wolitzky-Taylor, K., & Olatunji, B.O. (2012). Measurement of anxious traits: a contemporary review and synthesis. *Anxiety, Stress & Coping*, 25, 647-666. doi: 10.1080/10615806.2011.582949
- Epley, N., Akalis, S., Waytz, A., & Cacioppo, J.T. (2008). Creating Social Connection Through Inferential Reproduction: Loneliness and Perceived Agency in Gadgets, Gods, and Greyhounds. *Psychological Science*, 19, 114–120. doi:10.1111/j.1467-9280.2008.02056.x
- Fenigstein, A., & Vanable, P. A. (1992). Paranoia and self-consciousness. *Journal of Personality and Social Psychology*, 62, 129-138. doi: 10.1037/0022-3514.62.1.129
- Freeman, D., & Garety, P. (2014). Advances in understanding and treating persecutory delusions: a review. *Social Psychiatry and Psychiatric Epidemiology*, 49, 1179-1189. doi:10.1007/s00127-014-0928-7

- Freeman, D., Garety, P.A., Kuipers, E., Fowler, D., & Bebbington, P. E. (2002). A cognitive model of persecutory delusions. *British Journal of Clinical Psychology*, 41, 331–347. doi:10.1348/014466502760387461
- Garety, P.A., & Freeman, D. (2013). The past and future of delusions research: from the inexplicable to the treatable. *British Journal of Psychiatry*, 203, 327–333. doi:10.1192/bjp.bp.113.126953
- Garety, P.A., Kuipers, E., Fowler, D., Freeman, D., & Bebbington, P.E. (2001). A cognitive model of the positive symptoms of psychosis. *Psychological Medicine*, 31, 189–195. doi: 10.1017/s0033291701003312
- Gayer-Anderson, C., & Morgan, C. (2013). Social networks, support and early psychosis: A systematic review. *Epidemiology and Psychiatric Sciences*, 22, 131–146. doi:10.1017/S2045796012000406
- Hauge, S., & Kirkevold, M. (2010). Older Norwegians' understanding of loneliness. *International Journal of Qualitative Studies on Health and Well-being*, 5(1), 10.3402/qhw.v5i1.4654. doi:10.3402/qhw.v5i1.4654
- Hauser, D.J., Ellsworth, P.C., & Gonzalez, R. (2018). Are Manipulation Checks Necessary? *Frontiers in Psychology*, 9, 998. doi:10.3389/fpsyg.2018.00998
- Hawkley, L.C., & Cacioppo, J.T. (2010). Loneliness matters: A theoretical and empirical review of consequences and mechanisms. *Annals of Behavioral Medicine*, 40, 218–227. doi:10.1007/s12160-010-9210-8
- Hawkley, L.C., Hughes, M.E., Waite, L.J., Masi, C.M., Thisted, R.A., & Cacioppo, J.T. (2008). From social structural factors to perceptions of relationship quality and loneliness: The Chicago health, aging, and social relations study. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 63(6), S375–S384. doi:10.1093/geronb/63.6.S375
- Hayes, A.F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: The Guilford Press.
- Hu, M. (2009). Will Online Chat Help Alleviate Mood Loneliness? *Cyber Psychology & Behavior*, 12, 219–223. doi: 10.1089/cpb.2008.0134
- Kimhy, D., Delespaul, P., Corcoran, C., Ahn, H., Yale, S., & Malaspina, D. (2006). Computerized experience sampling method (ESMc): Assessing feasibility and validity among individuals with schizophrenia. *Journal of Psychiatric Research*, 40, 221–230. doi:10.1016/j.jpsychires.2005.09.007
- Lamster, F., Nittel, C., Rief, W., Mehl, S., & Lincoln, T. (2017). The impact of loneliness on paranoia: An experimental approach. *Journal of Behavior Therapy and Experimental Psychiatry*, 54, 51–57. doi: 10.1016/j.jbtep.2016.06.005

- Lim, M.H., Gleeson, J.F.M., Alvarez-Jimenez, M. & Penn, D.L. (2018). Loneliness in psychosis: a systematic review. *Social Psychiatry and Psychiatric Epidemiology*, 53, 221-238. doi: 10.1007/s00127-018-1482-5
- Lim, M.H., Rodebaugh, T.L., Zyphur, M.J., & Gleeson, J.F.M. (2016). Loneliness over time: The crucial role of social anxiety. *Journal of Abnormal Psychology*, 125, 620–630. doi: 10.1037/abn0000162
- Meltzer, H., Bebbington, P., Dennis, M. S., Jenkins, R., McManus, S., & Brugha, T. S. (2013). Feelings of loneliness among adults with mental disorder. *Social Psychiatry and Psychiatric Epidemiology*, 48, 5–13. doi: 10.1007/s00127-012-0515-8
- Qualter, P., Vanhalst, J., Harris, R., Van Roekel, E., Lodder, G., Bangee, M., ... Verhagen, M. (2015). Loneliness across the life span. *Perspectives on Psychological Science*, 10, 250-264. doi: 10.1177/1745691615568999.
- Ree, M.J., French, D., MacLeod, C., & Locke, V. (2008). Distinguishing Cognitive and Somatic Dimensions of State and Trait Anxiety: Development and Validation of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA). *Behavioural and Cognitive Psychotherapy*, 36, 313–332. doi: 10.1017/s1352465808004232
- Russell, D., Peplau, L.A., & Cutrona, C.E. (1980). The revised UCLA Loneliness Scale: Concurrent and discriminant validity evidence. *Journal of Personality and Social Psychology*, 39, 472-480. doi: 10.1037/0022-3514.39.3.472
- Spithoven, A.W.M., Bijttebier, P., & Goossens, L. (2017). It is all in their mind: A review on information processing bias in lonely individuals. *Clinical Psychology Review*, 58, 97-114. doi:10.1016/j.cpr.2017.10.003
- Stain, H. J., Galletly, C. A., Clark, S., Wilson, J., Killen, E. A., Anthes, L., ... Harvey, C. (2012). Understanding the social costs of psychosis: The experience of adults affected by psychosis identified within the second Australian National Survey of Psychosis. *Australian & New Zealand Journal of Psychiatry*, 46, 879–889. doi: 10.1177/0004867412449060
- Sündermann, O., Onwumere, J., Kane, F., Morgan, C., & Kuipers, E. (2014). Social networks and support in first-episode psychosis: Exploring the role of loneliness and anxiety. *Social Psychiatry and Psychiatric Epidemiology*, 49, 359–366. doi:10.1007/s00127-013-0754-3
- Vanhalst, J., Soenens, B., Luyckx, K., Van Petegem, S., Weeks, M. S., & Asher, S. R. (2015). Why do the lonely stay lonely? Chronically lonely adolescents' attributions and emotions in situations of social inclusion and exclusion. *Journal of Personality and Social Psychology*, 109, 932-948. <http://dx.doi.org/10.1037/pspp0000051>.

Appendices

Appendix A. PRISMA Checklist

Section/ Topic	#	Checklist item	reported on page
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	8
ABSTRACT			
Structured Summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	9
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	11
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	11
METHODS			
Protocol and Registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	12
Eligibility Criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	12
Information Sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	12
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	12
Study Selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	12
Data Collection Process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	13
Data Items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	13
Risk of Bias in Individual Studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	13
Summary Measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	12
Synthesis of Results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	13-14
Risk of Bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	13
Additional Analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	14, 19 & 20

RESULTS			
Study Selection	1 7	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	14 & 16
Study characteristics	1 8	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	21-22
Risk of Bias within Studies	1 9	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	17 & 23
Results of Individual Studies	2 0	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	18, 20 & 21
Synthesis of Results	2 1	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	17-20
Risk of Bias across Studies	2 2	Present results of any assessment of risk of bias across studies (see Item 15).	17 & 19
Additional Analysis	2 3	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	19-20
DISCUSSION			
Summary of Evidence	2 4	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	24-26
Limitations	2 5	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	26-27
Conclusions	2 6	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	27
FUNDING			
Funding	2 7	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	8

Appendix B. Risk of Bias Assessment Tool

Adapted AHRQ Quality Assessment Tool for Observational Studies

Each criterion is graded as Yes, No, Partial, or Unclear. Where an item is not applicable, it should be graded as NA. Factors to consider when making an assessment are listed under each criterion. In addition to qualitative assessment of each study using the below, gradings are assigned the following numerical values: Yes=2, Partial=1, No=0, Unclear=0. Where an item is graded as NA, no numerical value will be assigned. All numerical values are added up to create a total score for each study. To determine the degree to which each study achieved its maximum possible score, a percentage is calculated, based on the number of items which received a numerical value. Ratings of 100%-80% are taken to indicate low risk of bias.

1. Was the selection of the participant sample unbiased?

- A. Recruitment strategy is clearly described, e.g. how & where recruited
- B. Criteria for inclusion/exclusion of participants are clearly described
- C. Recruitment relatively free from bias, i.e. bias likely when recruitment primarily relied on newspaper adverts, posters, or offer extra credit for students

YES= A+B+C

PARTIAL= B+ one other

NO= only one of above met

2. Was the sample size adequate?

- A. Did the authors report conducting a priori power analysis or describe some other basis for determining adequacy of sample size for *their* primary outcome of interest? If yes, did the eventual sample size deviate by $\leq 10\%$ of the suggested sample size?
- B. Was data analysis appropriate for the sample size, e.g. were techniques used to deal with small sample size, was a Bonferroni correction or alternative used for multiple comparisons?

YES= A+B

PARTIAL= B only

NO= A only

3. Is the description of the participant sample adequate?

- A. Sample is well characterized in terms of baseline demographics, e.g. mean age, gender ratio, ethnicity, educational level, employment status
- B. Type of recruited sample is clearly described, e.g. general population, FEP, ARMS, psychosis

YES= A (mean age, gender ratio + at least two others) + B

PARTIAL= A (mean age, gender ratio + one other) + B

PARTIAL= A (mean age, gender ratio) + B

NO= only A or only B

4. Is the method for assessing attachment valid?

- A. Was the tool used valid and reliable for attachment assessments? Note that measures consisting of two or less items in a scale need to be downgraded; note that tools not originally designed to assess attachment need to be downgraded.
- B. Was the method used to assess attachment clearly described? i.e. what tool, how scored, whether attachment dimensions or attachment style assessed.

YES= A + B

PARTIAL= A only

PARTIAL= A (downgraded once) +B

NO= A (downgraded twice) + B

NO= A only (downgraded once or twice)

NO= B only

5. Is the method for assessing paranoia valid?

- A. Was the tool used valid and reliable for paranoia assessments in the studied population? (community screening measures will be suitable for non-clinical samples; psychiatric measures will be suitable for clinical samples; measures assessing experiences on the paranoia continuum may be suitable for both). Note that measures consisting of two or less items in a scale need to be downgraded; note that tools not originally designed to assess paranoia need to be downgraded.
- B. Was method used to assess paranoia clearly described? i.e. what tool, how scored

YES= A + B

PARTIAL= A only

PARTIAL= A (downgraded once) +B

NO= A (downgraded twice) + B

NO= A only (downgraded once or twice)

NO= B only

6. Adequate Handling of Missing Data

- A. Is missing data mentioned at all? If missing data was an issue, was it clearly reported, e.g. numbers and reasons?
- B. If missing data was an issue, was it $\leq 20\%$?
- C. If missing data are substantial, i.e. $>20\%$, were steps taken to minimize bias (e.g. imputation methods, sensitivity analysis)?

YES= A+B

PARTIAL= A+C

PARTIAL= B only

NO= A only

7. Were data analysis methods appropriate?

- A. Was normality of data etc checked prior to computation of correlations?
- B. Was the type of correlation coefficient used appropriate for the data, e.g. where data required it, were non-parametric versions used?

YES= A+B

PARTIAL= B only

NO= A only

Appendix C. Author Guidelines

British Journal of Clinical Psychology

<https://onlinelibrary.wiley.com/page/journal/20448260/homepage/forauthors.html>

Psychology and Psychotherapy: Theory, Research and Practice

<https://onlinelibrary.wiley.com/page/journal/20448341/homepage/forauthors.html>

MANUSCRIPT CATEGORIES & REQUIREMENTS

Articles should be no more than 5000 words (excluding the abstract, reference list, tables and figures). Brief reports should not exceed 2000 words and should have no more than one table or figure. Any papers that are over this word limit will be returned to the authors. Appendices are included in the word limit; however online appendices are not included.

In exceptional cases the Editor retains discretion to publish papers beyond this length where the clear and concise expression of the scientific content requires greater length (e.g., explanation of a new theory or a substantially new method). Authors must contact the Editor prior to submission in such a case. Please refer to the separate guidelines for **Registered Reports**. All systematic reviews must be pre-registered.

PREPARING THE SUBMISSION

Free Format Submission

British Journal of Clinical Psychology/ Psychology and Psychotherapy: Theory, Research and Practice now offers free format submission for a simplified and streamlined submission process. Before you submit, you will need:

- Your manuscript: this can be a single file including text, figures, and tables, or separate files – whichever you prefer. All required sections should be contained in your manuscript, including abstract, introduction, methods, results, and conclusions. Figures and tables should have legends. References may be submitted in any style or format, as long as it is consistent throughout the manuscript. If the manuscript, figures or tables are difficult for you to read, they will also be difficult for the editors and reviewers. If your manuscript is difficult to read, the editorial office may send it back to you for revision.
- The title page of the manuscript, including a data availability statement and your co-author details with affiliations. (*Why is this important? We need to keep all co-authors informed of the outcome of the peer review process.*) You may like to use [this template](#) for your title page.

Important: the journal operates a double-blind peer review policy. Please anonymise your manuscript and prepare a separate title page containing author details. (*Why is this important? We need to uphold rigorous ethical standards for the research we consider for publication.*)

Parts of the Manuscript

The manuscript should be submitted in separate files: title page; main text file; figures/tables; supporting information.

Title Page

You may like to use [this template](#) for your title page. The title page should contain:

- A short informative title containing the major key words. The title should not contain abbreviations (see Wiley's [best practice SEO tips](#));
- A short running title of less than 40 characters;
- The full names of the authors;
- The author's institutional affiliations where the work was conducted, with a footnote for the author's present address if different from where the work was conducted;
- Abstract;
- Keywords
- Acknowledgments.

Authorship

Please refer to the journal's Authorship policy in the Editorial Policies and Ethical Considerations section for details on author listing eligibility. When entering the author names into Editorial Manager, the corresponding author will be asked to provide a CRediT contributor role to classify the role that each author played in creating the manuscript. Please see the [Project CRediT](#) website for a list of roles.

Abstract

Please provide a structured abstract under the headings: Objectives, Methods, Results, Conclusions. For Articles, the abstract should not exceed 250 words. For Brief Reports, abstracts should not exceed 120 words.

Articles which report original scientific research should also include a heading 'Design' before 'Methods'. The 'Methods' section for systematic reviews and theoretical papers should include, as a minimum, a description of the methods the author(s) used to access the literature they drew upon. That is, the abstract should summarize the databases that were consulted and the search terms that were used.

Keywords

Please provide appropriate keywords.

Acknowledgments

Contributions from anyone who does not meet the criteria for authorship should be listed, with permission from the contributor, in an Acknowledgments section. Financial and material support should also be mentioned. Thanks to anonymous reviewers are not appropriate.

Practitioner Points

All articles must include Practitioner Points – these are 2-4 bullet points, following the abstract, with the heading 'Practitioner Points'. These should briefly and clearly outline the relevance of your research to professional practice. (The Practitioner Points should be submitted in a separate file.)

Main Text File

As papers are double-blind peer reviewed, the main text file should not include any information that might identify the authors. The main text file should be presented in the following order:

- Title
- Main text
- References
- Tables and figures (each complete with title and footnotes)
- Appendices (if relevant)

Supporting information should be supplied as separate files. Tables and figures can be included at the end of the main document or attached as separate files but they must be mentioned in the text.

- As papers are double-blind peer reviewed, the main text file should not include any information that might identify the authors. Please do not mention the authors' names or affiliations and always refer to any previous work in the third person.
- The journal uses British/US spelling; however, authors may submit using either option, as spelling of accepted papers is converted during the production process.

References

References should be prepared according to the ***Publication Manual of the American Psychological Association (6th edition)***. This means in text citations should follow the author-date method whereby the author's last name and the year of publication for the source should appear in the text, for example, (Jones, 1998). The complete reference list should appear alphabetically by name at the end of the paper. Please note that for journal articles, issue numbers are not included unless each issue in the volume begins with page 1, and a DOI should be provided for all references where available.

For more information about APA referencing style, please refer to the [**APA FAQ**](#).

Tables

Tables should be self-contained and complement, not duplicate, information contained in the text. They should be supplied as editable files, not pasted as images. Legends should be concise but comprehensive – the table, legend, and footnotes must be understandable without reference to the text. All abbreviations must be defined in footnotes. Footnote symbols: †, ‡, §, ¶, should be used (in that order) and *, **, *** should be reserved for P-values. Statistical measures such as SD or SEM should be identified in the headings.

Figures

Although authors are encouraged to send the highest-quality figures possible, for peer-review purposes, a wide variety of formats, sizes, and resolutions are accepted.

[**Click here**](#) for the basic figure requirements for figures submitted with manuscripts for initial peer review, as well as the more detailed post-acceptance figure requirements.

Legends should be concise but comprehensive – the figure and its legend must be understandable without reference to the text. Include definitions of any symbols used and define/explain all abbreviations and units of measurement.

Colour Figures. Figures submitted in colour may be reproduced in colour online free of charge. Please note, however, that it is preferable that line figures (e.g. graphs and charts) are supplied in black and white so that they are legible if printed by a reader in black and white. If an author would prefer to have figures printed in colour in hard copies of the journal, a fee will be charged by the Publisher.

Supporting Information

Supporting information is information that is not essential to the article, but provides greater depth and background. It is hosted online and appears without editing or typesetting. It may include tables, figures, videos, datasets, etc.

Click here for Wiley's FAQs on supporting information.

Note: if data, scripts, or other artefacts used to generate the analyses presented in the paper are available via a publicly available data repository, authors should include a reference to the location of the material within their paper.

General Style Points

For guidelines on editorial style, please consult the **APA Publication Manual** published by the American Psychological Association. The following points provide general advice on formatting and style.

- **Language:** Authors must avoid the use of sexist or any other discriminatory language.
- **Abbreviations:** In general, terms should not be abbreviated unless they are used repeatedly and the abbreviation is helpful to the reader. Initially, use the word in full, followed by the abbreviation in parentheses. Thereafter use the abbreviation only.
- **Units of measurement:** Measurements should be given in SI or SI-derived units. Visit the Bureau International des Poids et Mesures (BIPM) website for more information about SI units.
- **Effect size:** In normal circumstances, effect size should be incorporated.
- **Numbers:** numbers under 10 are spelt out, except for: measurements with a unit (8mmol/l); age (6 weeks old), or lists with other numbers (11 dogs, 9 cats, 4 gerbils).

Appendix D. Research Ethics Application

University of Edinburgh, School of Health in Social Science

RESEARCH ETHICS APPLICATION (REA)



The forms required when seeking ethical approval in the School of Health and Social Sciences have now been merged into this single electronic document. The sections you are required to complete will depend on the nature of your application. Please start to complete the form from the beginning and proceed as guided. On completion the **entire** document should be submitted electronically to your section's ethics administrator using the email addresses detailed on the final page.

FORM OVERVIEW	
FORM	COMPLETION
Project registration form	: Compulsory for all applications
Document checklist	: Compulsory for all applications
Level 1 Self Audit form	: To be completed for all research studies that are not subject to review by an external UK based ethical committee.
Level 2 /3 ethical review form	: To be completed when indicated by responses on the Level 1 form.
Level 4 ethical review form	: applies to research which is potentially problematic in that it may incorporate an inherent physical or emotional risk to researchers or participants, or involve covert surveillance or covert data collection.

PROJECT REGISTRATION FORM

This form is the first stage in applying for University ethical approval and should be completed prior to the commencement of any research project. Applications submitted without appropriate documentation will be returned.

Ethical approval is required for all projects by staff or students conducting research, or similar. Applicants should familiarise themselves with the School's Research Ethics Policy prior to completion.

PR1	Name of Applicant: Regina Murphy
PR2	Name of Supervisor¹: Dr Karen Goodall
PR3	Project Title: The role of loneliness in the etiology of paranoia- an experimental study
PR4	Subject Area (section of school): Clinical and Health Psychology
PR5	If student, type of assessed work that this application relates to: Doctorate in Clinical Psychology Thesis
PR6	Planned date of project submission: March 2020
PR7	Date ethics application submitted: 23-08-2018
PR8	(Date complete information submitted if different):
PR9	IRAS Approval Number if applicable: NA
The following to be completed by ethics administrator	
PR10	Date of initial response to applicant:
PR11	Date of final approval:
PR12	Amendments Requested Date:
PR13	Amendments Approved Date:

¹ Not applicable to staff members.

PR14 Reviewer 1
PR15 Reviewer 2 <i>Level 2/3/4 only</i>
DOCUMENTATION CHECKLIST

1) ^{DC1} Does your research project require extraction or collection of data abroad? (✓)

<input checked="" type="checkbox"/>	No	If 'No' Skip to Q2	
<input type="checkbox"/>	Yes	Local Ethical review needed, please confirm (✓) electronic attachment of: Application to ethical review panel in country of data collection (in English) + copy of letter of approval	

2) ^{DC2} For the purposes of this research study, will you access identifiable² information on any NHS patient? (✓)

<input checked="" type="checkbox"/>	No	If 'No' Skip to Q3	
<input type="checkbox"/>	Yes	Please confirm (✓) electronic attachment of:	Caldicott Guardian approval for use of NHS data (or confirmation that it is not required)

3) ^{DC3} Does the project require ethical review by an external UK committee e.g. NHS REC or Social Work?

<input checked="" type="checkbox"/>	No	If 'No' Skip to Q4	
<input type="checkbox"/>	Yes	Please confirm (✓) electronic attachment of:	NHS REC (IRAS) /other application form + copy of letter of approval
NOTE: You are <u>not</u> required to complete University ethical review forms. Skip to Q6			

4) ^{DC4} Unless you answered 'yes' to 3, you must also obtain ethical approval through the University of Edinburgh process. Please submit a Level 1 form (with 'Methods' summary) and, if indicated, a level 2/3/4 form as well.

SHSS Ethics paperwork	Forms: level 1	Summary of 'Methods'
Please indicate the SHSS Ethics forms completed herewith (✓):	2/3/4	
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

5) ^{DC5} If you have completed the Level 2/3/4 form please list any additional documentation provided in support of your application (E.g. Disclosure, consent form, participant information, GP letters etc., Data Storage Plan)

Documentation Name	These should reflect content	(✓)	Documentation Name	(✓)
1_Recruitment Poster			4_Participant Debrief Information Form	
2_Eligibility Screening Form			5_Dissemination Opt-In Form	
3_Participant Information & Consent Form				

6) Signatures

Regina Murphy		17-08-18
Applicant's Name	Applicant's Signature	Date signed
Dr Karen Goodall		17-08-18
Supervisor³ Name	Supervisor's Signature	Date signed

² 'Identifiable information' refers to information that would allow you to know, or be able to deduce, the identity of a patient. The most common examples of this would be accessing medical records or similar, or accessing a database that includes patients' names.

³ Not required for staff applications.

Please return an electronic copy of your UoE HSS Ethics Application Form (in its entirety) to your Section's Ethics Officer, accompanied by electronic copies of additional documents indicated above. We do not accept paper documentation; please scan all documents into electronic formats. Please keep a copy of all documentation for your records.

LEVEL 1 SELF AUDIT FORM

The audit is to be conducted by all staff and students conducting any type of empirical investigation, including research, audit or service evaluation.

The form should be completed by the principal investigator and, with the exception of staff, signed by a University supervisor.

^{SA1} Primary Research Question:

Please tick	What type of research are you planning to do?
	Study of a novel intervention or randomised clinical trial to compare interventions in clinical practice
✓	Study utilising questionnaires, interviews or measures, including auto-ethnographic data.
	Study limited to working with routinely collected clinical data.
	Meta-analysis or systematic review.
	Research database containing non-identifiable information.

^{SA2} Please provide a brief summary of your proposed study. Our interest is in areas of your methodology where ethical issues may arise so please focus your detail on areas such as recruitment, consent, describing your participants and the nature of their involvement, and data handling.

Project Summary

The proposed study will investigate whether the experience of increased loneliness leads to increased paranoia in adults from the general population. The study will use a modified version of the experimental design used by a German research group and employ a false-feedback paradigm to induce increased loneliness in participants (Lamster et al., 2017). The proposed study aims to address the following research questions:

1. Does the experience of increased loneliness lead to increased paranoia?
2. Is the relationship between loneliness and paranoia moderated by trait anxiety?
3. Is the moderation effect still significant when age and sex are controlled for?

Recruitment & Screening

In line with prior research in this area, the study will recruit a nonclinical convenience sample. Participants will be recruited through emails, social media posts and poster advertisements, e.g. displayed in university buildings and community centres. These will encourage potential participants to contact the researcher via preferred method, i.e. email/telephone/text. Those interested in participating will be asked to complete a self-report questionnaire prior to receiving a participation slot; it will collect socio-demographic data and screen for the following exclusion criteria: **(1)** age under 18 years; **(2)** cognitive impairment; **(3)** currently receiving treatment for a mental health difficulty. Please refer to the *Recruitment Poster* and *Eligibility Screening Form* for more information. If eligible, participants will be invited to attend the experiment at a University of Edinburgh (UoE) facility. Due to the nature of the study, the experimental manipulation will need to be masked prior to participation. Participants will therefore be informed that the study aims to evaluate a new measure. Please refer to the *Participant Information & Consent Form* for more information.

Experimental Procedure

Upon arrival, participants will complete a set of baseline paper questionnaires assessing state paranoia, trait anxiety and loneliness. Following this, increased loneliness will be induced through an experimental manipulation in three stages. Firstly, participants will be asked to write a short paragraph about a personal experience of feeling left out; this is expected to prime participants and enhance the induction of increased loneliness. Secondly, participants will receive an altered version of the UCLA Loneliness Scale containing modified items, e.g. *"I sometimes feel isolated from others"* (Russell et al., 1980). Due to the somewhat ambiguous wording, participants are expected to endorse these items and consequently obtain a high sum score on the questionnaire. Thirdly, participants will receive false feedback on the sum scores from the researcher, revealing that these are very high, e.g. *"Compared to 1800 persons of your age and sex, this represents an extremely high loneliness score. That means that only 17 % of the comparison group is lonelier than you. The majority is more satisfied than you with their level of social contacts, friends, and loved ones."* This false feedback paradigm was first used in a study on nostalgia (Wildschut et al., 2006) and later adapted by a German psychosis research group (Lamster et al., 2017). At the end of the experiment, participants will complete measures assessing state paranoia and loneliness once again. The experimental procedure is expected to last 30-40 minutes. To ensure that the induction of increased loneliness is successful, the study will be piloted with a sample of 34 participants; this sample size should be sufficient to detect a medium-sized effect when comparing pre-manipulation and post-manipulation loneliness scores using a dependent t-test, at 80% power and $\alpha=.05$.

Debriefing

To alleviate any negative affect resulting from the loneliness manipulation, participants will be shown an upbeat video clip after the experimental procedure. Following this, participants will be debriefed and receive information on the purpose of the study, the use of masking, UoE complaints procedure and relevant signposting if participation resulted in distress; please refer to the *Participant Debrief Information Form* for more information. Lastly, participants will be given the option to leave their contact details to receive information on the study findings. Participants who opt into this dissemination scheme will receive a PDF containing a lay summary of the study findings upon project completion. Please refer to the *Dissemination Opt-In Form* for more information.

Questionnaires

State Paranoia. In line with prior research, state paranoia will be assessed with a modified version of the *Paranoia Checklist* (PCL; Freeman, Garety, Bebbington, Smith et al., 2005). It consists of 18 items rated on a 5-point Likert scale and covers three domains- frequency, severity and distress. The PCL was developed to measure paranoia in nonclinical samples and contains items such as *"I need to be on my guard against others"*. The original version is reported to have excellent internal consistency (Cronbach's Alpha > .90) and is highly correlated with the Paranoia Scale ($r=.71$, $p < .001$), an established measure frequently used in research (Fenigstein & Vanable, 1992). Consistent with previous studies investigating changes in state paranoia, the PCL will be presented in a state-adapted format by changing the reference time in items to *"at the moment"* (e.g. Hartman et al., 2014; Lincoln et al., 2009). To reduce potential memory effects and mask the construct of interest, PCL items will be presented with distractor items in randomised order during both administrations.

Trait Anxiety. Trait anxiety will be assessed with the 20-item trait subscale of *State-Trait Anxiety Inventory* STAI; Spielberger et al., 1983). Items are rated on a 4-point Likert scale which ranges from *"Almost Never"* to *"Almost Always"*, with higher scores indicating higher anxiety. The STAI assesses stable aspects of anxiety proneness and includes items such as *"I worry too much over something that doesn't matter"*. The STAI appears to be one of very few measures for trait anxiety, however has been regularly used in research (e.g. VanDyke et al., 2004). STAI was reported to have good internal consistency (Cronbach's Alpha >.86) as well as test-retest reliability ($r=.86$) on initial development. The trait subscale of the STAI will be presented without alterations in its original format.

Loneliness. In line with Lamster and colleagues, loneliness will be manipulated using an adapted version of *UCLA Loneliness Scale*, a 20-item self-report questionnaire (UCLA-LS; Russell et al., 1980). Responses are rated on a 4-point Likert scale (1=never; 2=rarely; 3=sometimes; 4=always), with higher scores indicating greater loneliness. Loneliness at pre-manipulation and post-manipulation will be measured using a single item *"Right now I feel a bit lonely"* (Lamster et al., 2017; Wildschut et al., 2006). The item is rated on a 10-point Likert scale from *"I strongly disagree"* to *"I strongly agree"*. The use of a single-item measure to assess loneliness is thought to be the most straightforward assessment approach and does not reveal the construct of interest in the same way a loneliness-specific questionnaire would.

Data Analysis

Descriptive statistics and correlations will be computed for all measured variables. To assess whether the experimental manipulation leads to a change in loneliness, baseline and post scores on the loneliness check item will be compared with a paired-samples t-test or Wilcoxon signed-rank test, depending on whether normality of data is identified. The same analysis will be conducted to assess whether the experimental manipulation leads to changes in state paranoia.

To examine whether trait anxiety moderates the relationship between loneliness and paranoia, moderation analysis will be conducted through multiple linear regression using the following model: $\text{paranoia change} = \beta_0 + \beta_1 (\text{trait anxiety}) + \beta_2 (\text{loneliness change}) + \beta_3 (\text{trait anxiety} \times \text{loneliness change}) + \epsilon$; where β_0 indicates the intercept and ϵ indicates error. If the interaction term within this model is found to be statistically significant, the presence of a moderation effect is supported. The PROCESS-macro plug-in for SPSS (Hayes, 2013) will be used to investigate effects of loneliness changes on paranoia changes at three levels of trait anxiety- low (1SD below mean), medium (equal to mean) and high (1SD above mean); testing conditional effects using these values is recommended as standard practice for moderation analysis (see Aiken & West, 1991). The PROCESS-macro tool will estimate simple slopes and regions of significance for the interaction using ordinary least squares regression. To reduce multicollinearity, both variables contributing to the interaction term will be centred, i.e. the sample mean for each variable will be subtracted from each case. To examine whether a moderation effect can still be identified when socio-demographic variables are controlled for, age and sex will be added to the above model in a separate analysis through hierarchical data input. All effect sizes will be computed as R^2 .

Data Handling

Data will be managed in accordance with the General Data Protection Regulation 2018 and University of Edinburgh Data Management Policy. All paper copies, i.e. forms and questionnaires completed by participants, will be destroyed 3 months after study completion; this includes screening questionnaires completed by those who were not eligible to participate. Following study completion, anonymised study data will be stored within the Edinburgh DataShare repository for 10 years. Any potential uses of the data extending beyond the proposed study will be outlined in consent forms and participant information sheets.

Please circle your answer as appropriate:

	ETHICAL ISSUES		
SA3	Bringing the University into disrepute Is there any aspect of the proposed research which might bring the University into disrepute? For example, could any aspect of the research be considered controversial or prejudiced?	No	YES
SA4	Protection of research subject confidentiality <i>Will you make every effort to protect research subject confidentiality by conforming to the University of Edinburgh's guidance on data security, protection and confidentiality as specified in: www.ed.ac.uk/information-services/research-support/data-library/research-data-mgmt</i> <i>For example, there are mutually understood agreements about:</i> (a) non-attribution of individual responses; (b) Individuals, and organisations where necessary, being anonymised in stored data, publications and presentations; (c) publication and feedback to participants and collaborators; (d) With respect to auto-ethnographic work it is recognised that the subject's anonymity cannot be maintained but the confidentiality of significant others must be addressed.	NO	Yes

SA5	<p>Data protection and consent</p> <p><i>Will you make every effort to ensure the confidentiality of any data arising from the project by complying with the University of Edinburgh's Data Protection procedures (see http://www.ed.ac.uk/information-services/research-support/data-library/research-data-mgmt).</i></p> <p>For example</p> <ul style="list-style-type: none"> (a) Ensuring any participants recruited give consent regarding data collection, storage, archiving and destruction as appropriate; (c) Identifying information⁴, (e.g. consent forms) is held separately from data and is only accessible by the chief investigator and their supervisors; (e) There are no other special issues arising regarding confidentiality/consent. (f) That where NHS data is being accessed Caldicott Guardian approval has been obtained. <p>IT IS NECESSARY TO GIVE THE HEAD OF SCHOOL'S NAME AS THE CONTACT PERSON IN CASE OF ANY COMPLAINT. PLEASE MAKE SURE THAT THIS LINK IS PROVIDED on any Information sheet/consent form: (http://www.ed.ac.uk/files/imports/fileManager/WEB%20Complaint%20Form.pdf)</p>	NO	Yes
SA6	<p>Duty to disseminate research findings</p> <p>Are there issues which will prevent all participants and relevant stakeholders having access to a clear, understandable and accurate summary of the research findings should they wish?</p>	No	YES
SA7	<p>Moral issues and Researcher/Institutional Conflicts of Interest</p> <p><i>Are there any SPECIAL MORAL ISSUES/CONFLICTS OF INTEREST?</i></p> <p>Examples include, but are not limited to:</p> <ul style="list-style-type: none"> (a) Where the purposes of research are concealed; (b) Where respondents are unable to provide informed consent (c) Where there is financial or non-financial benefit for <i>anyone</i> involved in the research, or for their relative or friend. (d) Where research findings could impinge negatively or differentially upon participants or stakeholders (for example when selecting an unrepresentative sample of a larger population). (e) Where there is a dual relationship between the researcher and subject? E.g. Where the researcher is also the subject's practitioner or clinician. (f) Where research involves covert surveillance or covert data collection. (g) Where routinely collected data is used for research alongside novel data. <p>NOVEL DATA COLLECTION SHOULD NOT BE CONFLATED WITH ROUTINELY COLLECTED DATA. WHERE BOTH ARE BEING USED THIS NEEDS TO BE MADE CLEAR IN ANY COVERING LETTER, PARTICIPANT INFORMATION SHEET AND CONSENT FORM IN ORDER FOR INFORMED CONSENT TO BE POSSIBLE.</p>	No	YES

⁴ 'Identifiable information' refers to information that would allow you to know, or be able to deduce, the identity of a patient. The most common examples of this would be accessing medical records or similar, or accessing a database that includes patients' names.

SA8	<p>Potential physical or psychological harm, discomfort or stress</p> <p>Is there any foreseeable potential for:</p> <p>(a) significant psychological harm or stress for participants?</p> <p>(b) significant physical harm or discomfort for participants?</p> <p>(c) significant risk to the researcher?</p> <p>Examples of issues/ topics that have the potential to cause psychological harm, discomfort or distress and should lead you to answer 'yes' to this question include, but are not limited to: <i>Relationship breakdown; bullying; bereavement; mental health difficulties; trauma / PTSD; Violence or sexual violence; physical, sexual or emotional abuse in either children or adults; feedback of results from the project's assessments.</i></p>	No	YES
SA9	<p>Vulnerable participants</p> <p>Will you be recruiting any participants or interviewees who could be considered vulnerable?</p> <p>Examples of vulnerable groups, the inclusion of which should lead you to answer yes to this question include, but are not limited to: Clients or patients of either the researcher OR the person recruiting subjects; Children & young people; people who are in custody or care for example, offenders, looked after children or nursing home resident; persons with mental health difficulties including those accessing self-help groups; auto-ethnographic researchers examining distressing topics.</p>	No	YES

Assessment outcome:

SA10 Have you circled any answers in **BOLD** typescript? Please tick as appropriate

- No ☐ (i) Your responses on the completed self-audit confirm the ABSENCE OF REASONABLY FORESEEABLE ETHICAL RISKS.
(ii) Please now read the guidance below and provide the required signatures.
(iii) You are NOT REQUIRED to complete a level 2/3/4 application form.
(iv) Please submit the UoE HSS Ethics Application Form electronic document (in its entirety) along with ALL additional required documentation, failure to do so will mean that your form is returned to you.
- Yes ☒ (i) Your responses on the completed self-audit indicate that we require further information to consider your application.
(ii) Read the Guidance below and provide the required signatures.
(ii) You **ARE REQUIRED** to complete a level 2/3/4 application form.
(III) Please continue to the next part of this document where you will find the level 2/3/4 form

Subsequent to submission of this form, any alterations in the proposed methodology of the project should be reviewed by both the applicant and their supervisor. If the change to methodology results in a change to any answer on the form, then a resubmission to the Ethics subgroup is required.

The principal investigator is responsible for ensuring compliance with any additional ethical requirements that might apply, and/or for compliance with any additional requirements for review by external bodies.


ALL forms should be submitted in electronic format. Digital signatures or scanned in originals are acceptable. The applicant should keep a copy of all forms for inclusion in their thesis.

Regina Murphy
Applicant's Name


Applicant's Signature

17-08-18
Date

Dr Karen Goodall
Supervisor's Name


***Supervisor's Signature⁵**

17-08-18
Date

*NOTE to Supervisor: Ethical review will be based only on the information contained in this form. If countersigning this check-list as truly warranting all 'No' answers, you are taking responsibility, on behalf of the HSS and UoE, that the research proposed truly poses no ethical risks.

LEVEL 2/3/4 ETHICAL REVIEW

- Complete only if indicated in the conclusion of your level 1 form.
- Applications will be monitored and audited to ensure that the School Ethics Policy and Procedures are being complied with and applicants contacted in cases where there may be particular concerns or queries.
- Research must not proceed before ethical approval has been granted. For this reason it is particularly important that applications are submitted well in advance of any required date of approval.

If the answer to any of the questions below is 'yes', please elaborate and give details of how this issue is will be addressed to ensure that ethical standards are maintained. The response boxes will expand as you complete them. Forms that do not contain sufficient detail will be returned incurring delay.

BEFORE COMPLETING THE NEXT SECTION, PLEASE MAKE REFERENCE TO

<http://www.dataprotection.ed.ac.uk/activities/DPPolicyFINAL.htm>

<http://www.ed.ac.uk/schools-departments/records-management-section/data-protection/guidance-policies/research/research>

CONFIDENTIALITY AND HANDLING OF DATA	
ER1 What information about participants' /subjects' data will you collect and use?	
	Responses on questionnaires; age; sex
ER2 What is the risk category of the information? (See definitions contained in http://www.ed.ac.uk/schools-departments/records-management-section/data-protection/guidance-policies/encrypting-sensitive/data)	
	Low
ER3 Will the information include any of the following:	
	<ul style="list-style-type: none"> (a) racial or ethnic origin (b) political opinions (c) religious beliefs (d) trades union membership (e) physical or mental health (f) sexual life (g) commission of offences or alleged offences
	No
ER4 Who will have access to the raw data?	
	Regina Murphy & Dr Karen Goodall
ER5 What training will staff receive on their responsibilities for the safe handling of the data?	
	None required.
ER6 How will the confidentiality of the data, including the identity of participants, be ensured? Is there a strategy in place to replace disclosive identifiers of an individual or entity from the data?	
	All data collected during the study will be anonymised by assigning each participant a unique number code. The number code will be used to mark all data pertaining to the same participant, i.e. it will mark forms, questionnaires, and electronic data. Participant names will not be used on any study materials. Consent forms will be signed by participants with initials only and will be stored separately from other data.
ER7 Will the information be transferred to, shared with, supported by, or otherwise available to third parties outside the University?	

NO	If yes, explain why the third party needs to have access to the information and how the transfer of the information will be made secure. Attach a copy of the agreement you will use to regulate the transfer and use of data.
/	
ER8 Describe the physical and IT security arrangements you will put in place for the data.	
<p>Paper copies of forms/questionnaires will be stored in a locked filing cabinet in a University of Edinburgh office. Master copies of electronic data will be saved in appropriate format on DataStore, a secure networked drive hosted by the University of Edinburgh; data stored in DataStore are backed up automatically by the system. Further copies of all data will also be saved on an encrypted hard drive and backed up by the researcher regularly. Statistical analyses of the data will be conducted on a password-protected computer.</p>	
ER9 Does the system have a security code of practice under the University's Information Security Policy? (see http://www.ed.ac.uk/information-services/about/policies-and-regulations/security-policies/security-policy)	
YES	If NO, explain why one is not needed.
/	
ER10 Will the data be used, accessed or stored away from the University premises?	
YES	If YES, describe the arrangements you have put in place to safeguard the data from accidental or deliberate access, amendment or deletion when it is not on University premises, including when it is in transit.
<p>Electronic data saved on DataStore will be accessed by the researchers outside of UoE premises through a Virtual Private Network. The encrypted hard drive, used to store back-up copies of anonymised data, will be transported and kept in a lockable case to prevent access through others.</p>	
ER 11 Specify where the data files/audio/videotapes etc. will be retained after the study, how long they will be retained and how they eventually will be disposed of?	
<p>Paper copies of all forms/questionnaires will be destroyed 3 months after study completion. To ensure preservation, anonymised electronic data will be stored on Edinburgh DataShare, a digital repository of multi-disciplinary research datasets produced at the University of Edinburgh. The anonymised electronic data generated during this project may therefore be accessed by other approved studies in the future. It will be curated by DataShare for a period of 10 years, followed by a review every 5 years. This corresponds to recommendations by the Medical Research Council and is also in line with curation periods adopted by the Clinical Psychology Department at the University of Edinburgh.</p>	

ER12 How do you intend for the results of the research to be used?

The results of the proposed study will be presented in a thesis portfolio and submitted in partial fulfilment of the degree of Doctorate in Clinical Psychology. The thesis will subsequently be accessible to the public on the departmental Clinical Psychology Thesis Database. Additionally, the proposed study will also be submitted for publication in the Journal of Behavior Therapy and Experimental Psychiatry. The journal publishes experimental investigations of psychopathology, with a focus on causal mechanisms among other areas; its audience is appropriate for this study as it comprises professionals working in mental health settings, e.g. psychiatrists, therapists and clinical psychologists.

ER13 Will feedback of findings be given to participants/subjects?

YES If yes, how will this feedback be provided?

Participants will be invited to leave their contact details in order to receive information on the study findings. After the researcher has passed the viva examination, participants who opt into this dissemination scheme will receive a PDF containing a lay summary.

ER14 Using secondary data:

YES/NO (a) Is this reuse compatible with what the data subjects were originally told about the use of their data? (e.g. were they told that it would be destroyed at the end of the study?)

YES/NO (b) Is it likely that someone could be identified from this data? (It is extremely difficult to make something totally anonymous, so even with secondary data there may be a need to apply security and access restrictions to it).

For more information regarding data linkage in evaluating interventions for the benefit of the population's health, please see: <http://www.gov.scot/Topics/Statistics/datalinkageframework>

Your application at this level is likely to require additional documentation, for example a Data Storage Plan, consent forms or participant information sheets. Please return to the Documentation Checklist on page 2 to list your supporting documentation.

SECURITY-SENSITIVE MATERIAL

ER15 Does your research fit into any of the following security-sensitive categories? If so, indicate which.

NO Commissioned by the military

NO Commissioned under an EU security call

NO Involve the acquisition of security clearances

NO Concern groups which may be construed as terrorist or extremist

IF YOU HAVE ANSWERED YES TO ANY OF THESE CONTINUE TO ER16. IF YOU HAVE ANSWERED NO TO ALL OF THESE QUESTIONS MOVE TO ER21.

ER16 The Terrorism Act (2006) outlaws the dissemination of records, statements and other documents that can be interpreted as promoting or endorsing terrorist acts.

YES/NO Does your research involve the storage on a computer of such records, statements and other documents?

YES/NO Might your research involve the electronic transmission (e.g. as an email attachment) of records or statements?

IF YOU ANSWERED YES TO ANY OF THESE YOU ARE ADVISED TO STORE THE RELEVANT RECORDS OR STATEMENTS ELECTRONICALLY ON A SECURE UNIVERSITY FILE STORE. THE SAME APPLIES TO PAPER DOCUMENTS WITH THE SAME SORT OF CONTENT. THESE SHOULD BE SCANNED AND UPLOADED.

ACCESS TO THIS FILE STORE WILL BE PROTECTED BY A PASSWORD UNIQUE TO YOU AND YOUR SCHOOL RESEARCH ETHICS OFFICER. PLEASE INDICATE THAT YOU AGREE TO STORE ALL DOCUMENTS RELEVANT TO THESE QUESTIONS ON THAT FILE STORE:

YES/NO

ER17 Please indicate that you agree not to transmit electronically to any third party documents in the document store:

YES/NO

ER18 Will your research involve visits to websites that might be associated with extreme or terrorist organisations?

YES/NO

ER19 If you answer YES to ER18 you are advised that such sites may be subject to surveillance by the police. Accessing those sites from University IP addresses might lead to police enquiries. Please acknowledge that you understand this risk:

YES/NO

ER20 By submitting to the research ethics process, you accept that your School Research Ethics Officer and the convenor of the University's Compliance Group will have access to a list of titles of documents (but not the content of documents) in your document store. Please acknowledge that you accept this.

YES/NO

Countersigned by supervisor/manager:

Name:

Date:

RISKS TO, AND SAFETY OF, RESEARCHERS NAMED IN THIS APPLICATION	
ER21 Do any of those conducting the research named above need appropriate training to enable them to conduct the proposed research safely and in accordance with the ethical principles set out by the College?	
NO	
ER22 Are any of the researchers likely to be sent or go to any areas where their safety may be compromised, or they may need support to deal with difficult issues?	
NO	
Participants will be asked to attend appointments at the Dugald Stewart Building on the University of Edinburgh central campus. Appointments will be offered on weekdays during the opening hours of 08.30am to 06.30pm. Security staff are available during these hours should support be required by the researcher.	
ER23 Could researchers have any conflicts of interest?	
NO	
RISKS TO, AND SAFETY OF, PARTICIPANTS	
ER24 Are any of your participants children or protected adults (protected adults are those in receipt of registered care, health, community care or welfare services. Anyone who will have contact with children or protected adults requires approval from Disclosure Scotland at http://www.disclosurescotland.co.uk/)	
Do any of the researchers taking part in this study require Disclosure Scotland approval? (v)	
Not applicable	v
Relevant researcher/s has current Disclosure Scotland approval through a current NHS employment contract	
Yes	
*Ethical approval will be subject to documentation confirming Disclosure Scotland approval with this form.	
ER25 Could the research induce any psychological stress or discomfort?	
<p>The false-feedback paradigm used to induce increased loneliness was not reported to cause distress in participants in previous studies (Lamster et al., 2017; Wildschut et al., 2006). Accordingly, the likelihood of this occurring in the proposed study is anticipated to be low. To minimise any potential risk however, all volunteers will be screened with regard to the exclusion criteria presented above. This should ensure that individuals who may have a more pronounced emotional response (e.g. those experiencing mental health difficulties) are excluded from participation. Prior to signing the consent form, participants will be reminded that withdrawal is possible at any point.</p> <p>If a participant communicates distress during participation, the appointment will be stopped. The participant will then be asked if he/she wants to (1) continue the appointment; (2) take a break; or (3) end the appointment. If the participant feels unable to carry on, the researcher will provide appropriate reassurance and normalise the observed emotional response. In the unlikely event of distress being significant, the participant will be encouraged to contact a family member (or their GP as an alternative) prior to leaving the research facility. The participant will also receive the <i>Participant Debrief Information Form</i> outlining the University of Edinburgh complaints procedure and signposting to relevant services and help lines, e.g. the Samaritans.</p>	

ER26	Does the research involve any physically invasive or potentially physically harmful procedures?
	NO
ER27	Could this research adversely affect participants in any other way?
	NO
RESEARCH DESIGN	
ER28	Does the research involves living human subjects specifically recruited for this research project If 'no', go to section 6
	YES
ER29	How many participants will be involved in the study?
	Since a recent meta-analysis reported a moderate association of $r = .32$ between loneliness and psychosis symptoms (Michalska da Rocha et al., 2017), an effect of similar size is expected for the proposed study. To obtain a medium effect in a hierarchical regression analysis with five predictors, a sample of 78 is required at 80% power and $\alpha = .05$; this was determined through a priori calculation using G*Power 3.1.
ER30	What criteria will be used in deciding on inclusion/exclusion of participants?
	Volunteers from the general population are eligible to participate, unless any of the below criteria are met (1) age under 18 years, (2) existing cognitive impairment, (3) currently receiving treatment for mental health difficulty
ER31	How will the sample be recruited? (E.g. posters, letters, a direct approach- specify by whom.)
	Participants will be recruited through emails, social media posts and poster advertisements, e.g. displayed in university buildings and community centres. These will encourage potential participants to contact the researcher via preferred method, i.e. email, phone, or text.
ER32	Will the study involve groups or individuals who are in custody or care, such as students at school, self-help groups, residents of nursing home?
	NO
ER33	Will there be a control group?
	NO
ER34	What information will be provided to participants prior to their consent? (e.g. information leaflet, briefing session)
	YES – please refer to <i>Participant Information & Consent Form</i>
ER35	Participants have a right to withdraw from the study at any time. Please tick to confirm that participants will be advised of their rights, including the right to continue receiving services if they withdraw from the study.
	<input checked="checked" type="checkbox"/>
ER36	Will it be necessary for participants to take part in the study without their knowledge and consent? (e.g. covert observation of people in non-public places)
	NO

ER37	Where consent is obtained, what steps will be taken to ensure that a written record is maintained?
Participants will sign a paper copy of the <i>Consent Form</i> with their initials. Consent forms will be stored in a locked cabinet separate from other data; they will be destroyed 3 months after study completion.	
ER38	In the case of participants whose first language is not English, what arrangements are being made to ensure informed consent?
Since data is collected through questionnaires written in English, participants need to be proficient in English in order to be eligible for participation. This will be screened for using the <i>Eligibility Screening Form</i> .	
ER39	Will participants receive any financial or other benefit from their participation?
Participants will have the option to enter a prize draw for three £20 Amazon vouchers.	
ER40	Are any of the participants likely to be particularly vulnerable, such as elderly or disabled people, adults with incapacity, your own students, members of ethnic minorities, or in a professional or client relationship with the researcher?
NO	
ER41	Will any of the participants be under 16 years of age?
NO	
ER42	Will any of the participants be interviewed in situations which will compromise their ability to give informed consent, such as in prison, residential care, or the care of the local authority?
NO	
BRINGING THE UNIVERSITY INTO DISREPUTE	
ER43	If on the level one form you have answered YES that some aspect of the proposed research “might bring the University into disrepute”, please elaborate alongside how this might arise, and what steps will be taken by the researcher to mitigate and/or manage this, to minimise adverse consequences to the University.
NA	

Subsequent to submission of this form, **both the applicant and their supervisor should review any alterations in the proposed methodology of the project.** If the change to methodology results in a change to any answer on the form, then a resubmission to the Ethics subgroup is **required**.

The principal investigator is responsible for ensuring compliance with any additional ethical requirements that might apply, and/or for compliance with any additional requirements for review by external bodies.

ALL forms should be submitted in electronic format. Digital signatures or scanned in originals are acceptable. The applicant should keep a copy of all forms for inclusion in their thesis.

Regina Murphy		<u>17-08-18</u>
Applicant's Name	Applicant's Signature	Date
	Dr Karen Goodall	<u>17-08-18</u>
*Supervisor Signature ⁵	Supervisor Name	Date

I can confirm that the above application has been reviewed by two independent reviewers. It is their opinion that:

- a) Ethical issues have been satisfactorily addressed and no further response from the applicant is necessary,
OR

b) The ethical issues listed below arise or require clarification:

1. It is important to note that where deception is used there is an extra onus of responsibility on the researchers to justify the following points and to do so in a way that would seem reasonable to a layperson/member of the public:
 - (i) the importance of the research
 - (ii) why an alternate procedure cannot be used
 - (iii) that the proposed methodology WILL be able to answer the question that it sets out to answer
 - (iv) that it will *extend* existing research
 - (v) how extra care will be taken to ensure no lasting harm is caused by the deception.

2. In relation to each of the above points:
 - (i) This is really only fleetingly addressed in the proposal though there is an argument that could be made - the researcher(s) need to make this argument more clearly (cf Lamster et al 2017); it is also not strongly addressed in the debriefing document - this is particularly important when explaining/justifying to participants why it has been necessary to deceive them and (perhaps) create distress. This requires more consideration and amendment.
 - (ii) I can see that inducing an authentic experience of loneliness is central to the proposed hypothesis and requires deception
 - (iii) To establish this point it is important to say how the study of a *non* clinical sample is likely to be relevant to establishing something that is relevant to clinical samples (since this is the intended purpose of the research) i.e. is there evidence that paranoia in non-clinical samples in any way predisposes a person to clinical presentation or is paranoia a non-linear construct?;
 - (iv) This is perhaps the point of least clarity. The previous studies referred to in this proposal do suggest the need for further research but they indicate a need for *extending*, rather than simply replicating, what was previously done. The current proposal neither replicates what was done (some central features seem to be omitted), nor does this study address the recommendations for extending the previous studies eg Lamster et al (2017) "a larger sample size and a sample *with a pronounced risk of transition to psychosis*" or looking at relationship of loneliness with other symptoms of psychosis, or look at mechanisms - if deception is to be used there needs to be a good reason.
 - (v) There is mention that the previous studies do not report harmful effects of the loneliness induction - actually the previous studies do not mention how this issue was addressed at all. However they do mention that the effect of loneliness was mediated by the predisposition to psychosis which suggests that there may be indeed be a risk to the more vulnerable participants. We also know that in the student population there is a significant vulnerability to mental health issues. 'Extra care' could be established by:
 - a. After the debrief checking that the levels of loneliness and/or paranoia did not remain elevated; and asking whether the debrief has changed how they feel - this additional ethical step would also strengthen the work for publication purposes. Those with persistent elevation in scores could receive more targeted referral to support services.

- b. Being clearer in the debrief about how the induction of loneliness occurred so that the participant can clearly link their own responses to the deception (i.e. be clear that that deception included changing the usual items on the questionnaire so that it is likely that people would have high scores).
- c. Extra care also needs to be taken in screening - Lamster et al. were more stringent in their exclusion criteria - rather than simply excluding those 'receiving treatment' for a mental health issue, exclusion criteria included "a life-time diagnosis of a mental disorder". While you will still be relying on self-disclosure of mental illness this will at least emphasise to the individual that they need to consider their psychological well-being prior to giving consent. Consideration should also be given in the participant information sheet at the outset that the task may be associated with some distress.
- d. Consider including a post-study audit. It is increasingly considered good practice to include in the information/consent form the possibility that participants may be contacted after the study for brief feedback on their experience of participation. A small percentage (say 10%) may be followed up. This underscores the good ethical practice of the researchers and demonstrates their interest in participant experience/welfare especially when methods such as deception are used.

3. On a practical level some changes need to be made

- a. On the eligibility screening form Q 4 & 5 relate to illiteracy and LD - both of which are likely to make the completion of the form impossible. Q6 - receipt of help does not exclude people with mental health difficulties. Please give more consideration to this.
- b. Participant Information sheet and the de-briefing form need to be in plain English
- c. Poster as above but in addition the student provides a Gmail address rather than a University address and appears to give her mobile phone number (unclear whether this is a personal one).
- d. Participants are asked to see their GP/Student Counselling/ Samaritans if they are upset. This needs further consideration (as above). It is also important to check with Student Counselling that they will be willing to have their contact details given out in this way. On other occasions they have NOT been willing to be listed as a support service for post-experimental distress.

The applicant should respond to these comments in section 8 below.

Signature:



Position: Chair SREC

Date: 25.10.18

ER45 **APPLICANT'S RESPONSE (If required)**

We thank the reviewers for taking the time to consider this application. We have addressed each comment in below response and have also made amendments to supporting documents where appropriate. Please note that we have also requested a minor amendment in section ER

2(ii) This is really only fleetingly addressed in the proposal though there is an argument that could be made - the researcher(s) need to make this argument more clearly (cf Lamster et al 2017); it is also not strongly addressed in the debriefing document - this is particularly important when explaining/justifying to participants why it has been necessary to deceive them and (perhaps) create distress. This requires more consideration and amendment.

We thank the reviewers for this comment. As recommended here, the Participant Debrief Form has been amended to include more information on why the study is being conducted. Additional details on the main rationale for the proposed study are also outlined in the paragraphs below.

Loneliness is experienced when our needs for social connection are appraised as in some way unmet (Hawkey et al., 2008). Several studies identified moderate correlations between loneliness and paranoia, both for the general population and individuals with psychosis (Freeman et al., 2008; Sündermann et al., 2014). Despite evidence of co-occurrence, the direction of this relationship has been a matter of debate. Recent research has considered loneliness as a possible risk factor, i.e. as a variable which can precede and contribute to the development of paranoia. A study conducted in Germany aimed to test this hypothesis using an experimental design but reported findings which were somewhat inconclusive (Lamster et al., 2017). It is therefore still unclear whether experiencing increased loneliness can lead to increased paranoia.

Paranoia is one of the most common features of psychosis (Coid et al. 2013). Evidence of a causal link between loneliness and paranoia might therefore have implications for those with related diagnoses. Indeed, research indicates that the prevalence of loneliness among individuals with diagnosed psychosis is very high, e.g. in a survey of 1825 adults with psychosis, approximately 80% of the sample reported having experienced loneliness in the past year (Stain et al, 2012).

If loneliness is found to be a causal factor in the development of paranoia, there may be merit in targeting it through psychosocial interventions. This could be particularly important for preventing further deterioration in individuals experiencing prodromes, i.e. states which precede the onset of psychosis (e.g. Morrison et al., 2007). Findings from the proposed study may therefore provide support for exploring further avenues for non-pharmacological therapies. As outlined in the recent Mental Health Strategy, this would also be in line with efforts to encourage early intervention (Scottish Government, 2017).

2(iii) To establish this point it is important to say how the study of a nonclinical sample is likely to be relevant to establishing something that is relevant to clinical samples (since this is the intended purpose of the research) i.e. is there evidence that paranoia in non-clinical samples in any way predisposes a person to clinical presentation or is paranoia a non-linear construct?

Paranoia is thought to occur on a continuum, ranging from social evaluative concerns to persecutory delusions (Freeman & Garety, 2014). Paranoia varies in severity and can be experienced by individuals with and without mental health difficulties (Freeman, 2007). Research also indicates that paranoia in individuals without psychosis diagnoses can predict subsequent transition to psychosis (e.g. Welham et al., 2009; Wilcox et al., 2014). Experiencing elevated paranoia can therefore be part of a psychotic prodrome and constitute a risk factor for future deterioration.

Research suggests that psychotic experiences, including paranoia, are comparable in both populations, e.g. paranoid thoughts can be similar in content, but might differ in how frequently they are experienced (e.g. Johns et al., 2004). Findings from research with non-clinical samples can therefore also be relevant to clinical samples. As seen in the field of psychosis, it is also common for studies to be conducted with the general population before participants from clinical settings are recruited; this is often done to reduce participation burden for individuals who are already known to experience significant distress.

2(iv) This is perhaps the point of least clarity. The previous studies referred to in this proposal do suggest the need

for further research but they indicate a need for extending, rather than simply replicating, what was previously done. The current proposal neither replicates what was done (some central features seem to be omitted), nor does this study address the recommendations for extending the previous studies e.g. Lamster et al (2017) "a larger sample size and a sample with a pronounced risk of transition to psychosis" or looking at relationship of loneliness with other symptoms of psychosis, or look at mechanisms - if deception is to be used there needs to be a good reason.

As indicated above, Lamster and colleagues used a false-feedback paradigm to induce increased loneliness in participants (Lamster et al., 2017). Since only 18 participants were exposed to the relevant experimental condition however, statistical power was below the adequate level ($1-\beta=0.71$). The authors suggested that this may have led to findings not reaching statistical significance ($p=0.099$). Consequently, it is still unclear whether experiencing increased loneliness can lead to increased paranoia.

As this is the central research question, the proposed study aims to investigate this with a considerably larger participant sample ($N=78$). The methodology used will draw on elements seen in the referenced publication, but is not designed to be a replication. We believe that the changes evident in the proposed study, e.g. use of a written task, present methodological improvements. We hope that relevant changes will strengthen the false-feedback paradigm, ensuring that the loneliness induction is successful for as many participants as possible.

The inclusion of trait anxiety as a moderator variable also presents an advance on previous research. According to psychological models, danger anticipation is characteristic of paranoia and thus defines it as a state driven by threat beliefs (Freeman et al., 2002; Garety & Freeman, 2013). This conceptualisation points towards the role of anxious arousal in its etiology. Studies also suggest that those who experience prodromes often present as highly anxious (Shiomi et al., 2007). This suggests that anxiety proneness and psychosis proneness may be closely linked. The proposed study would be the first to examine the impact of this variable in the context of a loneliness study (as recommended in a systematic review of the loneliness-paranoia literature by Lim et al., 2017).

2(v.a) After the debrief checking that the levels of loneliness and/or paranoia did not remain elevated; and asking whether the debrief has changed how they feel - this additional ethical step would also strengthen the work for publication purposes. Those with persistent elevation in scores could receive more targeted referral to support services.

We thank the reviewers for this comment. As suggested here, two screening questions will be added on page 2 of the Participant Debrief Form to check **(1)** loneliness level after debriefing; and **(2)** how participants feel after debriefing.

The NHS defines distress as persistent if it is experienced over several weeks or months (see NHS websites on anxiety or depression). Similar definitions are also used in research studies (e.g. Stewart et al., 2017). Re-administration of measures after debriefing would only occur within the timeframe of a 40-50 minute appointment. Re-assessment following debrief would therefore only capture short-term changes. Initiating a referral after such an assessment seems problematic as it suggests that **(a)** experiencing distress after exposure to an emotive topic such as loneliness is not normal; **(b)** distress may not reduce on its own; **(c)** professional intervention is needed. This may be experienced as stigmatising by participants and possibly result in further worry.

To exercise extra care **(1)** participants will be advised to approach their GP if they have concerns about their mental health after taking part; **(2)** participants will also be advised that the possibility of a referral to support services can be discussed with their GP; **(3)** participants will be encouraged to bring a study leaflet to their GP appointment. This information has been added to Participant Debrief Form.

2(v.b) Being clearer in the debrief about how the induction of loneliness occurred so that the participant can

clearly link their own responses to the deception (i.e. be clear that that deception included changing the usual items on the questionnaire so that it is likely that people would have high scores).

We thank the reviewers for highlighting this issue. As recommended, we have added additional information on the loneliness induction procedure to the Participant Debrief Form.

2(v.c) Extra care also needs to be taken in screening - Lamster et al. were more stringent in their exclusion criteria - rather than simply excluding those 'receiving treatment' for a mental health issue, exclusion criteria included "a life-time diagnosis of a mental disorder". While you will still be relying on self-disclosure of mental illness this will at least emphasise to the individual that they need to consider their psychological well-being prior to giving consent. Consideration should also be given in the participant information sheet at the outset that the task may be associated with some distress.

As recommended by the reviewers, the criteria for this study have been changed to exclude individuals with a self-reported life-time diagnosis of mental health difficulties. This is now reflected in the questions on the amended Eligibility Screening Form. The Participant Information Form has also been amended to highlight that participation may be associated with some distress.

2(v.d) Consider including a post-study audit. It is increasingly considered good practice to include in the information/consent form the possibility that participants may be contacted after the study for brief feedback on their experience of participation. A small percentage (say 10%) may be followed up. This underscores the good ethical practice of the researchers and demonstrates their interest in participant experience/welfare especially when methods such as deception are used.

We thank the reviewers for this recommendation. As suggested, participants will be asked if they agree to be contacted with further questions about their experience; a corresponding item has been added to the Dissemination Opt-In Form, handed out the end of the appointment. To conduct the audit, we intend to contact the first 10 participants two weeks after their appointments. Please refer to the Follow-up Questionnaire for details on the questions we propose to use. We are happy to incorporate any further suggestions the Ethics Committee may have in relation to this.

3(a) On the eligibility screening form Q 4 & 5 relate to illiteracy and LD- both of which are likely to make the completion of the form impossible. Q6 - receipt of help does not exclude people with mental health difficulties. Please give more consideration to this.

The Eligibility Screening Form has been amended as suggested; the language has been simplified and questions have been reworded.

3(b) Participant information sheet and the de-briefing form need to be in plain English.

The language in the Participant Information Form and Participant Debrief Form has been simplified. All materials created for participants have been checked for readability using an online programme; all have a Gunning Fog Index below 8- this is indicative of near-universal accessibility and is categorised as being 'easy to read'.

3(c) Poster as above but in addition the student provides a Gmail address rather than a University address and appears to give her mobile phone number (unclear whether this is a personal one).

The Recruitment Poster has been edited as recommended; the language has been simplified, contact details have been amended.

3(d) Participants are asked to see their GP/Student Counselling/ Samaritans if they are upset. This needs further

consideration (as above). It is also important to check with Student Counselling that they will be willing to have their contact details given out in this way. On other occasions they have NOT been willing to be listed as a support service for post-experimental distress.

Information provided in the signposting section of the Participant Debrief Form has been amended to include more detail. Ronnie Millar, Director of the UoE Counselling Service, agreed for contact details to be listed.

Please note- we originally proposed to use the State-Trait Anxiety Inventory (STAI; Spielberger et al., 1983) to assess trait anxiety in participants (see section SA2). We have now decided to use an alternative measure instead, namely the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA; Ree et al., 2000). A review of trait anxiety measures indicated that the STICSA had greater discriminant validity than the STAI (Elwood et al., 2012), i.e. it is more highly correlated with measures of anxiety and less highly correlated with measures of depression (Grös et al., 2007). The STICSA may thus be a purer measure of trait anxiety than the STAI and should be preferable.

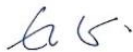
Signature:



Date: 19-11-2018

ER46 **CONCLUSION TO ETHICAL REVIEW (if required)**

The applicant's response to our request for further clarification or amendments has now satisfied the requirements for ethical practice and the application has therefore been approved.



Signature:

Position: Chari SREC

Date: 10.12.18

Appendix E. Ethical Approval Letter



SCHOOL of HEALTH IN SOCIAL SCIENCE
CLINICAL AND HEALTH PSYCHOLOGY

The University of Edinburgh
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Telephone 0131 651 3969
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Email submitting.ethics@ed.ac.uk

Regina Murphy
Trainee Clinical Psychologist
School of Health in Social Science
University of Edinburgh

14 February 2019

Dear Regina,

Application for Level 2 Approval

Reference: CLIN565

Project Title: The role of loneliness in the etiology of paranoia - an experimental study

Academic Supervisor: Karen Goodall

Thank you for submitting the above research project for review by the Department of Clinical and Health Psychology Ethics Research Panel. I can confirm that the submission has been independently reviewed and was approved on the 10th December 2018.

Should there be any change to the research protocol it is important that you alert us to this as this may necessitate further review.

Yours sincerely,

Kirsty Gardner
Administrative Secretary
Clinical Psychology

Appendix F. AsPredicted Registration

ASPREDICTEDCONFIDENTIAL - FOR PEER-REVIEW ONLY

The role of loneliness in the etiology of paranoia- an experimental study. (#24240)

Created: 05/31/2019 02:22 PM (PT)

Shared: 05/31/2019 02:29 PM (PT)

This pre-registration is not yet public. This anonymized copy (without author names) was created by the author(s) to use during peer-review. A non-anonymized version (containing author names) will become publicly available only if an author makes it public. Until that happens the contents of this pre-registration are confidential.

1) Have any data been collected for this study already?

It's complicated. We have already collected some data but explain in Question 8 why readers may consider this a valid pre-registration nevertheless.

2) What's the main question being asked or hypothesis being tested in this study?

- 1) The experience of increased loneliness leads to increased paranoia.
- 2) The relationship between loneliness change & paranoia change is moderated by trait anxiety.
- 3) The above relationship is still moderated by trait anxiety even after age & sex are controlled for

3) Describe the key dependent variable(s) specifying how they will be measured.

Loneliness will be measured using the single item "Right now I feel a bit lonely", rated on a 10-point Likert scale from "I strongly disagree" to "I strongly agree".

Paranoia will be assessed with a modified version of the Paranoia Checklist (PCL; Freeman et al., 2005). It consists of 18 items rated on a 5-point Likert scale from "not at all" to "very strongly". The PCL will be presented in a state-adapted format by changing the reference time of items to "at the moment".

Trait Anxiety will be measured using the trait version of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA; Ree et al., 2008). It consists of 21 items rated on a 4-point Likert scale from "almost never" to "almost always".

4) How many and which conditions will participants be assigned to?

All participants will be assigned to the same condition and experience the same experimental manipulation (aimed at inducing an increase in level of loneliness). Pre-manipulation scores and post-manipulation scores will be compared.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.

To assess whether there is a significant change in paranoia, baseline and post scores on the adapted Paranoia Scale will be compared with a paired-samples t-test or Wilcoxon signed-rank test, depending on whether normality of data is identified.

To examine whether trait anxiety moderates the relationship between loneliness change and paranoia change, moderation analysis will be conducted through multiple linear regression using the following model: $\text{paranoia change} = \beta_0 + \beta_1 (\text{trait anxiety}) + \beta_2 (\text{loneliness change}) + \beta_3 (\text{trait anxiety} \times \text{loneliness change}) + \epsilon$; where β_0 indicates the intercept and ϵ indicates error. If the interaction term within this model is found to be statistically significant, the presence of a moderation effect is supported. The PROCESS-macro plug-in for SPSS will be used to investigate effects of loneliness changes on paranoia changes at three levels of trait anxiety- low (1SD below mean), medium (equal to mean) and high (1SD above mean).

To examine whether a moderation effect can still be identified when socio-demographic variables are controlled for, age and sex will be added to the above model in a separate analysis through hierarchical data input. All effect sizes will be computed as R^2 .

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

Extreme outliers will be identified by applying the interquartile range rule (3xIQR), specifically by using a box plot with additional inspection of a histogram. Data will be analysed including and excluding extreme outliers; both will be reported for comparison purposes.

7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.

Data collection will stop once complete data on all relevant variables (loneliness, paranoia, trait anxiety, age & sex) have been collected from 78 participants. If collected data are incomplete for any participant (e.g. data on one of the variables missing), the relevant case will be excluded and replaced.

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

This study uses a false feedback manipulation to induce increased loneliness in participants. To ensure that this induction of increased loneliness was effective, it was piloted with a sample of 34 participants. Loneliness scores at pre-manipulation and post-manipulation were compared; the effect was determined to be statistically significant. The study will now go ahead using the piloted false feedback manipulation, with data collection

Verify authenticity: <http://aspredicted.org/blind.php?x=4g6xn6>

Appendix G. Study Materials



Interpersonal Experiences & Thoughts about Others

Participant Information

Invitation

I am inviting you to take part in a new study at the University of Edinburgh. Before you decide whether you want to take part, you need to understand what the study is about and what would be involved for you. Please take time to read the information below. Let me know if you have a question or if anything is not clear.

What is the study about?

My name is Regina Murphy. As part of my training to become a Clinical Psychologist, I am conducting this research study to test a new questionnaire. The questionnaire examines how our experiences with others affect the way we think about the world.

What is involved?

You will do a short writing exercise and fill in different questionnaires. You will get feedback on your questionnaire scores and watch a short video at the end of your appointment. Taking part in this study should take about 40 to 50 minutes.

Benefits and Risks

Some of the tasks involved in this study will remind you of unpleasant experiences. This can be associated with distress. There are no direct benefits to you taking part. If you choose to, you can enter a prize draw to win one of three £30 gift vouchers.

Right to Withdraw

Taking part in this study is voluntary. You can withdraw from this study at any time. You do not have to tell me why you want to withdraw. If you withdraw, any forms you have already filled in will be destroyed.

Confidentiality

All questionnaires will be anonymised by giving you a number to replace your name. The information collected during the study will be written up as part of a doctoral thesis. It might also be submitted for publication in a scientific journal. Your identity will be kept confidential at all times.

Contact Information

If you have questions about this study, please contact me on gina.murphy1@nhs.net. If you want to discuss other issues, you can also contact my academic supervisor Dr Karen Goodall on karen.goodall@ed.ac.uk.

Complaints Information

This study was approved by the School of Health in Social Science Research Ethics Committee. If you have concerns about this study or want to make a complaint about it, you can contact Professor Matthias Schwannauer, Head of School, on +44 (0)131 651 3954 or m.schwannauer@ed.ac.uk.



Interpersonal Experiences & Thoughts about Others

Consent Form

**Please put your initials in each box if you agree with the statement.
You need to initial all of the boxes to be able to take part in this study.**

1. I confirm that I have read and understood the above information sheet. I have had the opportunity to ask questions, and these have been answered fully. ☐

2. I understand that taking part in this study is voluntary. I understand that I can withdraw at any time, without giving any reason. ☐

3. I understand that the data I provide will be stored within the Edinburgh DataShare repository for 10 years. I also understand that I cannot be identified through my data. ☐

4. I agree to take part in the above study. ☐

Participant ID

Date

Signature by Initials

Person Taking Consent

Date

Signature by Initials



Interpersonal Experiences & Thoughts about Others

Debrief Information

Thank you for taking part in my study today. Your help with this research is very important. I want to give you more information on what this study is about. Please take time to read this document as many times as you want to. Please also answer the questions on the second page and return it to me. Let me know if you have a question or if anything is not clear.

What is this study about?

When people experience paranoia, they might worry about others' intentions and even feel threatened in some way. While anyone can experience paranoia from time to time, it is often higher in people who have mental health difficulties such as psychosis. This study aims to examine whether feeling lonelier can lead to a rise in paranoia. By finding out how loneliness and paranoia are related, we might be able to improve the support for people with psychosis.

What happened during the study?

This study examined whether making you feel lonelier changed your level of paranoia. You filled in a loneliness questionnaire on which all statements were changed to include the word sometimes, for example "I sometimes feel isolated from others". This made you more likely to agree with the statements and get a higher score. The feedback you received on your score was made up; it was designed to make you feel lonelier for a while. As this only works if you are not aware of it, I could not tell you about it earlier.

Complaints & Contact Information

This study was approved by the School of Health in Social Science Research Ethics Committee. If you have concerns about this study or want to make a complaint about it, you can contact Professor Matthias Schwannauer, Head of School, on +44 (0)131 651 3954 or m.schwannauer@ed.ac.uk For other questions about this study, you can contact me directly on gina.murphy1@nhs.net You can also contact my supervisor Dr Karen Goodall on karen.goodall@ed.ac.uk.

Support

If you are worried about your mental health after taking part, please see your GP. Bring this information sheet with you and tell your GP about your experience. Your GP can talk to you about whether a referral for further support would be helpful. If you are upset after taking part, you can also contact one of these services:

- Counselling for University of Edinburgh Students: 0131 6504170 or Student.Counselling@ed.ac.uk
- Counselling for University of Edinburgh Staff: 0131 650 2513 or Staff.Counsellor@ed.ac.uk
- Breathing Space: 0800 838 587
- The Samaritans: 116 123
- NHS 24: 111

Appendix H. Thesis References

Aiken, L.S. & West, S.G. (1991). *Multiple Regression: Testing and Interpreting interactions*. Newbury Park: Sage.

*Ascone, L., Schlier, B., Sundag, J., & Lincoln, T.M. (2019). Pathways from insecure attachment dimensions to paranoia: The mediating role of hyperactivating emotion regulation versus blaming others. *Psychology and Psychotherapy: Theory, Research and Practice*. doi: 10.1111/papt.12208. [Epub ahead of print]

Bakermans-Kranenburg, M.J., & van IJzendoorn, M.H. (2009). The first 10,000 Adult Attachment Interviews: distributions of adult attachment representations in clinical and non-clinical groups. *Attachment & Human Development*, 11, 223–263. doi: 10.1080/14616730902814762.

Bartholomew, K., & Horowitz, L.M. (1991). Attachment styles among young adults: A test of a four - category model. *Journal of Personality and Social Psychology*, 61, 226-244. doi: 10.1037/0022-3514.61.2.226

Bebbington, P. E., McBride, O., Steel, C., Kuipers, E., Radovanović, M., Brugha, T., ... Freeman, D. (2013). The structure of paranoia in the general population. *British Journal of Psychiatry*, 202, 419–427. doi:10.1192/bjp.bp.112.119032

Bell, M., Fiszdon, J., Richardson, R., Lysaker, P., & Bryson, G. (2007). Are self-reports valid for schizophrenia patients with poor insight? Relationship of unawareness of illness to psychological self-report instruments. *Psychiatry Research*, 151, 37–46. doi: 10.1016/j.psychres.2006.04.012

Bentall, R.P. (2014). The search for elusive structure: a promiscuous realist case for researching specific psychotic experiences such as hallucinations. *Schizophrenia Bulletin*, 40 Suppl 4(Suppl 4), S198–S201. doi:10.1093/schbul/sbu044

Bentall, R.P., & Fernyhough, C. (2008). Social predictors of psychotic experiences: specificity and psychological mechanisms. *Schizophrenia Bulletin*, 34, 1012-1020. doi: 10.1093/schbul/sbn103

Bentall, R.P., Rowse, G., Shryane, N., Kinderman, P., Howard, R., Blackwood, N., ... Corcoran, R. (2009). The Cognitive and Affective Structure of Paranoid Delusions. *Archives of General Psychiatry*, 66, 236- 247. doi: 10.1001/archgenpsychiatry.2009.1

Bentall, R.P., de Sousa, P., Varese, F., Wickham, S., Sitko, K., Haarmans, M., & Read, J. (2014). From adversity to psychosis: Pathways and mechanisms from specific adversities to specific symptoms. *Social Psychiatry and Psychiatric Epidemiology*, 49, 1011-1022. doi: 10.1007/s00127-014-0914-0

Berry, K., Barrowclough, C., & Wearden, A. (2007). A review of the role of adult attachment style in psychosis: Unexplored issues and questions for further research. *Clinical Psychology Review*, 27, 458–475. doi: 10.1016/j.cpr.2006.09.006

*Berry, K., Barrowclough, C., & Wearden, A. (2008). Attachment theory: A framework for understanding symptoms and interpersonal relationships in psychosis. *Behaviour Research and Therapy*, 46, 1275–1282. doi: 10.1016/j.brat.2008.08.009

Berry, K., Danquah, A.N., & Wallin, D. (2014). Introduction. In A.N. Danquah & K. Berry (Eds.), *Attachment Theory in Adult Mental Health: A Guide to Clinical Practice* (pp. 3-15). New York, NY: Routledge.

*Berry, K., Wearden, A., Barrowclough, C., & Liversidge, T. (2006). Attachment styles, interpersonal relationships and psychotic phenomena in a non-clinical student sample. *Personality and Individual Differences*, 41, 707–718. doi: 10.1016/j.paid.2006.03.009

Borenstein, M., Hedges, L.V., Higgins, J.P.T., & Rothstein, H.R. (2010). A basic introduction to fixed-effect and random-effects models for meta-analysis. *Research Synthesis Methods*, 1, 97–111. doi: 10.1002/jrsm.12

Brennan, K.A., Clark, C.L., & Shaver, P.R. (1998). Self-report measurement of adult romantic attachment: An integrative overview. In J.A. Simpson & W.S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 46–76). New York, NY: Guilford.

Bretherton, I., & Munholland, K.A. (2008). Internal working models in attachment relationships: Elaborating a central construct in attachment theory. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of Attachment: Theory, Research, and Clinical Applications* (pp. 102-127). New York, NY: The Guilford Press.

Cacioppo, J.T., & Cacioppo, S. (2018). Loneliness in the modern age: An evolutionary theory of loneliness (ETL). *Advances in Experimental Social Psychology*, 58, 127-197. doi: 10.1016/bs.aesp.2018.03.003

Cacioppo, J.T., Hawkley, L.C., Ernst, J.M., Burleson, M., Berntson, G.G., Nouriani, B., & Spiegel, D. (2006). Loneliness within a nomological net: An evolutionary perspective. *Journal of Research in Personality*, 40, 1054-1085. doi:10.1016/j.jrp.2005.11.007

Cacioppo, J.T., Tassinary, L.G., & Berntson, G.G. (eds). (2017). *(Handbook) of Psychophysiology*. Cambridge: Cambridge University Press.

Campbell, L., & Marshall, T. (2011). Anxious Attachment and Relationship Processes: An Interactionist Perspective. *Journal of Personality*, 79, 1219–1250. doi: 10.1111/j.1467-6494.2011.00723.x

Carr, S. C., Hardy, A., & Fornells-Ambrojo, M. (2018). Relationship between attachment style and symptom severity across the psychosis spectrum: A meta-analysis. *Clinical Psychology Review*, 59, 145–158. doi: 10.1016/j.cpr.2017.12.001

*Castilho, P., Martins, M. J., Pinto, A. M., Viegas, R., Carvalho, S., & Madeira, N. (2017). Understanding the effect of attachment styles in paranoid ideation: The mediator role of experiential avoidance. *Journal of Contextual Behavioral Science*, 6, 42–46. doi: 10.1016/j.jcbs.2016.11.007

Chau, A.K.C., Zhu, C., & So, S. H.W. (2019). Loneliness and the psychosis continuum: a meta-analysis on positive psychotic experiences and a meta-analysis on negative psychotic experiences. *International Review of Psychiatry*, 1 20. doi:10.1080/09540261.2019.1636005

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Coid, J.W., Ullrich, S., Kallis, C., Keers, R., Barker, D., Cowden, F., & Stamps, R. (2013). The relationship between delusions and violence: findings from the East London first episode psychosis study. *JAMA Psychiatry*, 70, 465-471. doi: 10.1001/jamapsychiatry.2013.12

Collins, N.L., & Feeney, B.C. (2004). Working Models of Attachment Shape Perceptions of Social Support: Evidence From Experimental and Observational Studies. *Journal of Personality and Social Psychology*, 87, 363–383. doi: 10.1037/0022-3514.87.3.363

Cozzarelli, C., Karafa, J.A., Collins, N.L., & Tagler, M.J. (2003). Stability and change in adult attachment styles: Associations with personal vulnerabilities, life events, and global construals of self and others. *Journal of Social and Clinical Psychology*, 22, 315-346. doi: 10.1521/jscp.22.3.315.22888

*Darrell-Berry, H., Bucci, S., Palmier-Claus, J., Emsley, R., Drake, R., & Berry, K. (2017). Predictors and mediators of trait anger across the psychosis continuum: The role of attachment style, paranoia and social cognition. *Psychiatry Research*, 249, 132–138. doi: 10.1016/j.psychres.2017.01.007

Derogatis, L.R. (1997). SCL-90: Administration, scoring and procedures manual-I for the (revised) version and other instruments of the psychopathology rating scale series. Baltimore, MD: Clinical Psychometrics Research Unit, Johns Hopkins University School of Medicine.

*Dunne, C. (2011). *The Association between Attachment and Schizotypy*. Unpublished doctoral dissertation, University of Edinburgh.

Egger, M., Smith, G.D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *British Medical Journal*, 315, 629–634. doi: 10.1136/bmj.315.7109.629

Elahi, A., Perez Algorta, G., Varese, F., McIntyre, J.C., & Bentall, R.P. (2017). Do paranoid delusions exist on a continuum with subclinical paranoia? A multi-method taxometric study. *Schizophrenia Research*, 190, 77-81. doi: 10.1016/j.schres.2017.03.022

Ellett, L., Kingston, J., & Chadwick, P. (2018). State paranoia and urban cycling. *Psychiatry Research*, 266, 341-344. doi:10.1016/j.psychres.2018.03.035

Elwood, L.S., Wolitzky-Taylor, K., & Olatunji, B.O. (2012). Measurement of anxious traits: a contemporary review and synthesis. *Anxiety, Stress & Coping*, 25, 647-666. doi: 10.1080/10615806.2011.582949

Epley, N., Akalis, S., Waytz, A., & Cacioppo, J.T. (2008). Creating Social Connection Through Inferential Reproduction: Loneliness and Perceived Agency in Gadgets, Gods, and Greyhounds. *Psychological Science*, 19, 114–120. doi:10.1111/j.1467-9280.2008.02056.x

Feeney, J.A., Noller, P., & Hanrahan, M. (1994). Assessing adult attachment. In M. B. Sperling & W.H. Berman (Eds.), *Attachment in adults: clinical and developmental perspectives* (pp. 122–158). New York, NY: Guilford.

Fenigstein, A., & Vanable, P.A. (1992). Paranoia and self-consciousness. *Journal of Personality and Social Psychology*, 62, 129-138. doi: 10.1037//0022-3514.62.1.129

*Fish, S. (2010). *The Association between Childhood Experiences of Parental Neglect and Antipathy, Schemas, Adult Attachments and Positive Symptoms of Psychosis*. Unpublished doctoral dissertation, University of East Anglia.

*Fornells-Ambrojo, M., Elenbaas, M., Barker, C., Swapp, D., Navarro, X., Rovira, A., ... Slater, M. (2016). Hypersensitivity to Contingent Behavior in Paranoia. *The Journal of Nervous and Mental Disease*, 204, 148–152. doi: 10.1097/NMD.0000000000000414

Fraley, R.C., Heffernan, M.E., Vicary, A.M., & Brumbaugh, C.C. (2011). The Experiences in Close Relationships-Relationship Structures questionnaire: A method for assessing attachment orientations across relationships. *Psychological Assessment*, 23, 615-625. doi: 10.1037/a0022898

Fraley, R.C., & Shaver, P.R. (2000). Adult romantic attachment: Theoretical developments, emerging controversies, and unanswered questions. *Review of General Psychology*, 4, 132-154. doi: 10.1037/1089-2680.4.2.132

- Fraley, R.C., Waller, N.G., & Brennan, K.A. (2000). An item response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology*, 78, 350–365. doi: 10.1037/0022-3514.78.2.350
- Freeman, D., Dunn, G., Fowler, D., Bebbington, P., Kuipers, E., Emsley, R., ... Garety, P. (2013). Current Paranoid Thinking in Patients With Delusions: The Presence of Cognitive-Affective Biases. *Schizophrenia Bulletin*, 39, 1281–1287. doi: 10.1093/schbul/sbs145
- Freeman, D., & Garety, P.A. (2000). Comments on the content of persecutory delusions: Does the definition need clarification? *British Journal of Clinical Psychology*, 39, 407-414. doi: 10.1348/014466500163400
- Freeman, D. & Garety, P.A. (2014). Advances in understanding and treating persecutory delusions: a review. *Social Psychiatry and Psychiatric Epidemiology*, 49, 1179-1189. doi: 10.1007/s00127-014-0928-7
- Freeman, D., Garety, P.A., Bebbington, P.E., Smith, B., Rollinson, R., Fowler, D., ... Dunn, G. (2005). Psychological investigation of the structure of paranoia in a non-clinical population. *The British Journal of Psychiatry*, 186, 427-435. doi: 10.1192/bjp.186.5.427
- Freeman, D., Garety, P.A., Kuipers, E., Fowler, D., & Bebbington, P. E. (2002). A cognitive model of persecutory delusions. *British Journal of Clinical Psychology*, 41, 331–347. doi:10.1348/014466502760387461
- Freeman, D., Loe, B.S., Kingdon, D., Startup, H., Molodynski, A., Rosebrock, L., ... Bird, J. (2019). The revised Green et al., Paranoid Thoughts Scale (R-GPTS): psychometric properties, severity ranges, and clinical cut-offs. *Psychological Medicine* 1–10. doi: 10.1017/ S0033291719003155
- Freeman, D., McManus, S., Brugha, T., Meltzer, H., Jenkins, R., & Bebbington, P. (2011). Concomitants of paranoia in the general population. *Psychological Medicine*, 41, 923-936. Doi: 10.1017/S0033291710001546
- Garety, P.A., & Freeman, D. (2013). The past and future of delusions research: from the inexplicable to the treatable. *British Journal of Psychiatry*, 203, 327-333. doi:10.1192/bjp.bp.113.126953
- Garety, P.A., Kuipers, E., Fowler, D., Freeman, D., & Bebbington, P.E. (2001). A cognitive model of the positive symptoms of psychosis. *Psychological Medicine*, 31, 189–195. doi: 10.1017/s0033291701003312
- Gayer-Anderson, C., & Morgan, C. (2013). Social networks, support and early psychosis: A systematic review. *Epidemiology and Psychiatric Sciences*, 22, 131-146. doi:10.1017/S2045796012000406

- Green, C.E.L., Freeman, D., Kuipers, E., Bebbington, P., Fowler, D., Dunn, G., & Garety, P.A. (2008). Measuring ideas of persecution and social reference: the Green et al. Paranoid Thought Scales (GPTS). *Psychological Medicine*, 38, 101-111. doi:10.1017/s0033291707001638
- Griffin, D.W., & Bartholomew, K. (1994). Models of the self and other: Fundamental dimensions underlying measures of adult attachment. *Journal of Personality and Social Psychology*, 67, 430-445. doi: 10.1037/0022-3514.67.3.430
- Gumley, A.I., Taylor, H.E., Schwannauer, M., & MacBeth, A. (2014). A systematic review of attachment and psychosis: Measurement, construct validity and outcomes. *Acta Psychiatrica Scandinavica*, 129, 257–274. doi: 10.1111/acps.12172
- Hajdúk, M., Klein, H.S., Harvey, P.D., Penn, D.L., & Pinkham, A.E. (2018). Paranoia and interpersonal functioning across the continuum from healthy to pathological - Network analysis. *British Journal of Clinical Psychology*, 58, 19-34. doi: 10.1111/bjc.12199
- Hauge, S., & Kirkevold, M. (2010). Older Norwegians' understanding of loneliness. *International Journal of Qualitative Studies on Health and Well-being*, 5(1), 10.3402/qhw.v5i1.4654. doi:10.3402/qhw.v5i1.4654
- Hauser, D.J., Ellsworth, P.C., & Gonzalez, R. (2018). Are Manipulation Checks Necessary? *Frontiers in Psychology*, 9, 998. doi:10.3389/fpsyg.2018.00998
- Hawkey, L.C., & Cacioppo, J.T. (2010). Loneliness matters: A theoretical and empirical review of consequences and mechanisms. *Annals of Behavioral Medicine*, 40, 218–227. doi:10.1007/s12160-010-9210-8
- Hawkey, L.C., Hughes, M.E., Waite, L.J., Masi, C.M., Thisted, R.A., & Cacioppo, J.T. (2008). From social structural factors to perceptions of relationship quality and loneliness: The Chicago health, aging, and social relations study. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 63(6), S375–S384. doi:10.1093/geronb/63.6.S375
- Hayes, A.F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: The Guilford Press.
- Hazan, C., & Shaver, P. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology*, 52, 511–524. doi: 10.4324/9781351153683-17
- Hedges, L.V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. Orlando, FL: Academic Press.
- Higgins, J.P.T. (2008). Commentary: Heterogeneity in meta-analysis should be expected and appropriately quantified. *International Journal of Epidemiology*, 37, 1158–1160. doi: 10.1093/ije/dyn204

Higgins, J.P.T. and Green, S. (2011). *Cochrane Handbook for Systematic Reviews of Interventions*. Version 5.1.0. The Cochrane Collaboration. Accessed at <http://handbook-5-1.cochrane.org>

Higgins, J., & Thompson, S.G. (2002). Quantifying heterogeneity in a meta-analysis. *Statistics in Medicine*, 21, 1539–1558. doi: 10.1002/sim.1186

Hodgekins, J., Coker, S., Freeman, D., Ray-Glover, K., Bebbington, P., Garety, P., ... Fowler, D. (2012). Assessing Levels of Subthreshold Psychotic Symptoms in the Recovery Phase: The Schizotypal Symptoms Inventory (SSI). *Journal of Experimental Psychopathology*, 3, 582-593. doi:10.5127/jep.021211

Hu, M. (2009). Will Online Chat Help Alleviate Mood Loneliness? *Cyber Psychology & Behavior*, 12, 219–223. doi: 10.1089/cpb.2008.0134

Hunter, J.E., & Schmidt, F.L. (2004). *Methods of Meta-Analysis: Correcting Error and Bias in Research Findings (2nd ed.)*. Thousand Oaks, CA: Sage.

*Hutton, J., Ellett, L., & Berry, K. (2017). Adult attachment and paranoia: an experimental investigation. *The Cognitive Behaviour Therapist*, 10, e4. doi: 10.1017/S1754470X17000058

*James, G. (2015). *Using Working Models of Attachment to Understand Paranoia in the General Population*. Unpublished doctoral dissertation, University College London.

Johns, L.C., Cannon, M., Singleton, N., Murray, R.M., Farrell, M., Brugha, T., & ... Meltzer, H. (2004). Prevalence and correlates of self-reported psychotic symptoms in the British population. *British Journal of Psychiatry*, 185, 298-305. doi: 10.1192/bjp.185.4.298

*Jones, J.E. (2015). *The role of attachment, emotion regulation and recovery style in psychosis*, Unpublished doctoral dissertation, University of Birmingham.

Kay, S.R., Fiszbein, A., & Opler, L.A. (1987). The positive and negative syndrome scale (PANSS) for schizophrenia. *Schizophrenia Bulletin*, 13, 261-276. doi: 10.1093/schbul/13.2.261

Kimhy, D., Delespaul, P., Corcoran, C., Ahn, H., Yale, S., & Malaspina, D. (2006). Computerized experience sampling method (ESMc): Assessing feasibility and validity among individuals with schizophrenia. *Journal of Psychiatric Research*, 40, 221–230. doi:10.1016/j.jpsychires.2005.09.007

Korver-Nieberg, N., Berry, K., Meijer, C., & de Haan, L. (2014). Adult attachment and psychotic phenomenology in clinical and non-clinical samples: A systematic review. *Psychology and Psychotherapy: Theory, Research and Practice*, 87, 127–154. doi: 10.1111/papt.12010

- *Korver-Nieberg, N., Fett, A.K.J., Meijer, C.J., Koeter, M.W., Shergill, S.S., de Haan, L., & Krabbendam, L. (2013). Theory of mind, insecure attachment and paranoia in adolescents with early psychosis and healthy controls. *Australian and New Zealand Journal of Psychiatry*, 47, 737–745. doi: 10.1177/0004867413484370
- Lamster, F., Nittel, C., Rief, W., Mehl, S., & Lincoln, T. (2017). The impact of loneliness on paranoia: An experimental approach. *Journal of Behavior Therapy and Experimental Psychiatry*, 54, 51–57. doi: 10.1016/j.jbtep.2016.06.005
- Larose, S., & Bernier, A. (2001). Social support processes: Mediators of attachment state of mind and adjustment in late adolescence. *Attachment and Human Development*, 3, 96-120. doi: 10.1080/14616730010024762
- Lavin, R., Bucci, S., Varese, F., & Berry, K. (2019). The relationship between insecure attachment and paranoia in psychosis: A systematic literature review. *British Journal of Clinical Psychology*. doi: 10.1111/bjc.12231 [Epub ahead of print]
- Lim, M.H., Gleeson, J.F.M., Alvarez-Jimenez, M. & Penn, D.L. (2018). Loneliness in psychosis: a systematic review. *Social Psychiatry and Psychiatric Epidemiology*, 53, 221-238. doi: 10.1007/s00127-018-1482-5
- Lim, M.H., Rodebaugh, T.L., Zyphur, M.J., & Gleeson, J.F.M. (2016). Loneliness over time: The crucial role of social anxiety. *Journal of Abnormal Psychology*, 125, 620–630. doi: 10.1037/abn0000162
- *MacBeth, A., Schwannauer, M., & Gumley, A. (2008). The association between attachment style, social mentalities, and paranoid ideation: An analogue study. *Psychology and Psychotherapy*, 81, 79–93. doi: 10.1348/147608307X246156
- *Meins, E., Jones, S.R., Fernyhough, C., Hurndall, S., & Koronis, P. (2008). Attachment dimensions and schizotypy in a non-clinical sample. *Personality and Individual Differences*, 44, 1000–1011. doi: 10.1016/j.paid.2007.10.026
- Melo, S., Corcoran, R., Shryane, N., & Bentall, R.P. (2009). The persecution and deservedness scale. *Psychology and Psychotherapy: Theory, Research and Practice*, 82, 247-260. doi: 10.1348/147608308x398337
- Meltzer, H., Bebbington, P., Dennis, M. S., Jenkins, R., McManus, S., & Brugha, T. S. (2013). Feelings of loneliness among adults with mental disorder. *Social Psychiatry and Psychiatric Epidemiology*, 48, 5–13. doi: 10.1007/s00127-012-0515-8
- Mikulincer, M. (1995). Attachment style and the mental representation of the self. *Journal of Personality and Social Psychology*, 69, 1203-1215. doi: 10.1037/0022-3514.69.6.1203
- Mikulincer, M. & Shaver, P.R. (2003). The attachment behavioral system in adulthood: Activation, psychodynamics, and interpersonal processes. In M. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 35). Academic Press.

Mikulincer, M., & Shaver, P.R. (2007). *Attachment in Adulthood: Structure, Dynamics, and Change*. New York, NY: Guilford Press.

Mikulincer, M., & Shaver, P.R. (2012). An attachment perspective on psychopathology. *World Psychiatry*, 11, 11-15. doi: 10.1016/j.wpsyc.2012.01.003

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D.G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Annals of Internal Medicine*, 151, 264–269. doi: 10.1371/journal.pmed.1000097

*Newman-Taylor, K., Kemp, A., Potter, H., & Au-Yeung, S.K. (2017). An Online Investigation of Imagery to Attenuate Paranoia in College Students. *Journal of Child and Family Studies*, 27, 853–859. doi: 10.1007/s10826-017-0934-y

Nieminen, P., Lehtiniemi, H., Vähäkangas, K., Huusko, A., & Rautio, A. (2013). Standardised regression coefficient as an effect size index in summarising findings in epidemiological studies. *Epidemiology Biostatistics and Public Health*, 10(4), 4–15. doi: 10.2427/8854

van Os, J., Hanssen, M., Bijl, R.V., & Ravelli, A. (2000). Strauss (1969) revisited: a psychosis continuum in the general population? *Schizophrenia Research*, 45, 11–20. doi: 10.1016/s0920-9964(99)00224-8

*Osswald, K. (2010). *What are they up to? Developmental pathways of paranoid thinking: an analogue study*. Unpublished doctoral dissertation, University of Glasgow.

Pascuzzo, K., Moss, E., & Cyr, C. (2015). Attachment and Emotion Regulation Strategies in Predicting Adult Psychopathology. *SAGE Open*, 5(3), 1-15. doi: 10.1177/2158244015604695

*Pearce, J., Simpson, J., Berry, K., Bucci, S., Moskowitz, A., & Varese, F. (2017). Attachment and dissociation as mediators of the link between childhood trauma and psychotic experiences. *Clinical Psychology & Psychotherapy*, 24, 1304–1312. doi: 10.1002/cpp.2100

Pereg, D., & Mikulincer, M. (2004). Attachment Style and the Regulation of Negative Affect: Exploring Individual Differences in Mood Congruency Effects on Memory and Judgment. *Personality and Social Psychology Bulletin*, 30, 67–80. doi: 10.1177/0146167203258852

*Pickering, L., Simpson, J., & Bentall, R.P. (2008). Insecure attachment predicts proneness to paranoia but not hallucinations. *Personality and Individual Differences*, 44, 1212–1224. doi: 10.1016/j.paid.2007.11.016

Pietromonaco, P.R., & Barrett, L.F. (2000). The internal working models concept: What do we really know about the self in relation to others? *Review of General Psychology*, 4, 155–175. doi: 10.1037/1089-2680.4.2.155

Pinkham, A. E., Harvey, P. D., & Penn, D. L. (2016). Paranoid individuals with schizophrenia show greater social cognitive bias and worse social functioning than non-paranoid individuals with schizophrenia. *Schizophrenia Research: Cognition*, 3, 33–38. doi: 10.1016/j.scog.2015.11.002

*Ponizovsky, A.M., Vitenberg, E., Baumgarten-Katz, I., & Grinshpoon, A. (2013). Attachment styles and affect regulation among outpatients with schizophrenia: Relationships to symptomatology and emotional distress. *Psychology and Psychotherapy: Theory, Research and Practice*, 86, 164–182. doi: 10.1111/j.2044-8341.2011.02054.x

Poulton, R., Caspi, A., Moffitt, T.E., Cannon, M., Murray, R., & Harrington, H. (2000). Children's Self-Reported Psychotic Symptoms and Adult Schizophreniform Disorder. *Archives of General Psychiatry*, 57, 1053-1058. doi: 10.1001/archpsyc.57.11.1053

Qualter, P., Vanhalst, J., Harris, R., Van Roekel, E., Lodder, G., Bangee, M., ... Verhagen, M. (2015). Loneliness across the life span. *Perspectives on Psychological Science*, 10, 250-264. doi: 10.1177/1745691615568999.

Raihani, N.J., & Bell, V. (2017). Paranoia and the social representation of others: a large-scale game theory approach. *Scientific Reports*, 7, 4544. doi: 10.1038/s41598-017-04805-3

Raine, A. (1991). The SPQ: A scale for the assessment of schizotypal personality based on DSM-III-R criteria. *Schizophrenia Bulletin*, 17, 556-564. doi: 10.1093/schbul/17.4.555

Rankin, P., Bentall, R., Hill, J., & Kinderman, P. (2005). Perceived Relationships with Parents and Paranoid Delusions: Comparisons of Currently Ill, Remitted and Normal Participants. *Psychopathology*, 38, 16–25. doi: 10.1159/000083966

Read, J., & Gumley, A. (2010). Can attachment theory help explain the relationship between childhood adversity and psychosis? In S. Benamer (Ed.), *Telling stories? Attachment-based approaches to the treatment of psychosis* (pp. 51-94). London, UK: Karnac Books Ltd.

Ree, M.J., French, D., MacLeod, C., & Locke, V. (2008). Distinguishing Cognitive and Somatic Dimensions of State and Trait Anxiety: Development and Validation of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA). *Behavioural and Cognitive Psychotherapy*, 36, 313–332. doi: 10.1017/s1352465808004232

Rupinski, M.T., & Dunlap, W.P. (1996). Approximating Pearson product-moment correlations from Kendall's tau and Spearman's rho. *Educational and Psychological Measurement*, 56, 419-429. doi: 10.1177/0013164496056003004

Russell, D., Peplau, L.A., & Cutrona, C.E. (1980). The revised UCLA Loneliness Scale: Concurrent and discriminant validity evidence. *Journal of Personality and Social Psychology*, 39, 472-480. doi: 10.1037/0022-3514.39.3.472

*Russo, D.A., Stochl, J., Hodgekins, J., Iglesias-González, M., Chipps, P., Painter, M., ... Perez, J. (2018). Attachment styles and clinical correlates in people at ultra high risk for psychosis. *British Journal of Psychology*, 109, 45–62. doi: 10.1111/bjop.12249

*Sheinbaum, T., Kwapil, T.R., & Barrantes-Vidal, N. (2014). Fearful attachment mediates the association of childhood trauma with schizotypy and psychotic-like experiences. *Psychiatry Research*, 220, 691–693. doi: 10.1016/j.psychres.2014.07.030

*Sitko, K., Bentall, R.P., Shevlin, M., & Sellwood, W. (2014). Associations between specific psychotic symptoms and specific childhood adversities are mediated by attachment styles: An analysis of the National Comorbidity Survey. *Psychiatry Research*, 217, 202–209. doi: 10.1016/j.psychres.2014.03.019

Sitko, K., Varese, F., Sellwood, W., Hammond, A., & Bentall, R. (2016). The dynamics of attachment insecurity and paranoid thoughts: An experience sampling study. *Psychiatry Research*, 246, 32-38. Doi: 10.1016/j.psychres.2016.08.057

*Smailes, D. (2014). *Parental bonding, attachment, reality discrimination, and psychotic-like experiences*. Unpublished doctoral thesis, Durham University.

Solomon, Z., Dekel, R., & Mikulincer, M. (2008). Complex trauma of war captivity: a prospective study of attachment and post-traumatic stress disorder. *Psychological Medicine*, 38, 1427–1434. doi: 10.1017/S0033291708002808

Spithoven, A.W.M., Bijttebier, P., & Goossens, L. (2017). It is all in their mind: A review on information processing bias in lonely individuals. *Clinical Psychology Review*, 58, 97-114. doi:10.1016/j.cpr.2017.10.003

Sroufe, L.A., Egeland, B., Carlson, E.A., & Collins, W.A. (2005). *The development of the person: The Minnesota study of risk and adaptation from birth to adulthood*. New York, NY: Guilford Publications.

Stain, H. J., Galletly, C. A., Clark, S., Wilson, J., Killen, E. A., Anthes, L., ... Harvey, C. (2012). Understanding the social costs of psychosis: The experience of adults affected by psychosis identified within the second Australian National Survey of Psychosis. *Australian & New Zealand Journal of Psychiatry*, 46, 879–889. doi: 10.1177/0004867412449060

Stefanis, N.C., Hanssen, M., Smirnis, N.K., Avramopoulos, D.A., Evdokimidis, I.K., Stefanis, C.N., ... van Os, J. (2002). Evidence that three dimensions of psychosis

have a distribution in the general population. *Psychological Medicine*, 32, 347–358. doi: 10.1017/S0033291701005141.

Sterne, J.A., & Egger, M. (2001). Funnel plots for detecting bias in meta-analysis: guidelines on choice of axis. *Journal of Clinical Epidemiology*, 54, 1046–1055. doi: 10.1016/s0895-4356(01)00377-8

*Strand, J., Goulding, A., & Tidefors, I. (2015). Attachment styles and symptoms in individuals with psychosis. *Nordic Journal of Psychiatry*, 69, 67–72. doi: 10.3109/08039488.2014.929740

Strauss, J.S. (1969). Hallucinations and Delusions as Points on Continua Function. *Archives of General Psychiatry*, 21(5), 581–586. doi: 10.1001/archpsyc.1969.01740230069010

Sündermann, O., Onwumere, J., Kane, F., Morgan, C., & Kuipers, E. (2014). Social networks and support in first-episode psychosis: Exploring the role of loneliness and anxiety. *Social Psychiatry and Psychiatric Epidemiology*, 49, 359–366. doi:10.1007/s00127-013-0754-3

Taylor, J.L., & John, C.H. (2004). Attentional and memory bias in persecutory delusions and depression. *Psychopathology*, 37, 233–241. doi: 10.1159/000080719

Taylor, P.J., Rietzschel, J., Danquah, A.N., & Berry, K. (2015). The role of attachment style, attachment to therapist and working alliance in response to psychological therapy. *Psychology and Psychotherapy: Theory, research and practice*, 88, 240–253. doi: 10.1111/papt.12045.

*Tiliopoulos, N., & Goodall, K. (2009). The neglected link between adult attachment and schizotypal personality traits. *Personality & Individual Differences*, 47, 299–304. doi: 10.1016/j.paid.2009.03.017

Valmaggia, L.R., Day, F.L., Kroll, J., Laing, J., Byrne, M., Fusar-Poli, P., & McGuire, P. (2015). Bullying victimisation and paranoid ideation in people at ultra high risk for psychosis. *Schizophrenia Research*, 168, 68–73. doi: 10.1016/j.schres.2015.08.029

Vanhalst, J., Soenens, B., Luyckx, K., Van Petegem, S., Weeks, M. S., & Asher, S. R. (2015). Why do the lonely stay lonely? Chronically lonely adolescents' attributions and emotions in situations of social inclusion and exclusion. *Journal of Personality and Social Psychology*, 109, 932–948. <http://dx.doi.org/10.1037/pspp0000051>.

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software*, 36, 1–48. doi: 10.18637/jss.v036.i03

*Wickham, S., Sitko, K., & Bentall, R. P. (2015). Insecure attachment is associated with paranoia but not hallucinations in psychotic patients: The mediating role of negative self-esteem. *Psychological Medicine*, 45, 1495–1507. doi: 10.1017/S0033291714002633.

Wilcox, J., Briones, D., Quadri, S., & Tsuang, M. (2014). Prognostic implications of paranoia and thought disorder in new onset psychosis. *Comprehensive Psychiatry*, 55, 813–817. doi: 10.1016/j.comppsy.2013.12.010

Williams, J., Plassman, B., Burke, J., Holsinger, T., & Benjamin, S. (2010). *Preventing Alzheimer's disease and cognitive decline*. (Vol. Evidence Report/Technology Assessment No. 193.). Rockville: Agency for Healthcare Research and Quality.

Wittchen, H.U., & Kessler, R.C. (1994). Modifications of the CIDI in the National Comorbidity Survey: The Development of the UM-CIDI. NCS Working Paper No.2. Accessed at <http://www.hcp.med.harvard.edu/ncs/ftpdir/um-cidi.pdf>

****study was synthesised in meta-analysis***